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P R E F A C E.



This Catalogue (which is a complete revision of the former Catalogue, published in 1876) has been prepared with reference throughout to the fact that there are two different objects which a Member may have in view when consulting the catalogue of a library. These are, (1) to ascertain whether it contains some particular book, the title and authorship of which he knows more or less perfectly; (2) to ascertain what books it contains bearing upon some particular subject, which he may wish to study.

With a view to the first object, each book is entered in the Catalogue under two headings, (*a*) the author's surname, (*b*) the first *significant* word (omitting articles, prepositions, &c.) which occurs in its title. In the case of works in foreign languages, the book is entered under the first significant word both of its original title and of its English equivalent, except in cases where the two are practically identical, *e.g.* Chain and Chaîne.

With a view to the second object, the books in the library have been grouped together, as far as possible, under the general Subjects to which they relate, these subjects being inserted in their proper places, and printed in heavy type. Under the subject-headings the various works are not generally placed alphabetically, but arranged as far as possible into sub-groups, according to the different parts of the main subject. The full title, date, and other particulars of each book are given under this heading; and the entries under the other headings are cross-referenced to it. This subject-arrangement may also assist a Member who is searching for a particular book; since, if he has an imperfect recollection of the title and author's name, he will probably be able to identify it, if in the catalogue, on turning to the subject to which it relates. There are, of course, many works which cannot be grouped under any general subject; and these are entered only under the two headings of title and author's name. On

the other hand some works fall with equal propriety under either of two subject-headings ; and these will be found under both.

For convenience of reference, the list of subject-headings, as described above, is here given.

LIST OF SUBJECTS.

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ENGINEERING.	METEOROLOGY.	TRANSACTIONS.
EXHIBITIONS.	MINERALOGY.	UNITED STATES.

WALTER R. BROWNE,

May 1881.

Secretary.

Institution of Mechanical Engineers.

LIBRARY CATALOGUE.

1881.

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ABBOT, Lieut. H. L., Report upon the Mississippi River. *See* RIVERS.

ABEL, C. D., Patent Laws. *See* PATENT LAWS.

ABERNETHY, J., Presidential Address, Institution of Civil Engineers. *See* ADDRESSES.

ABNEY, Lieut., Instructions in Photography. *See* PHOTOGRAPHY.

ABSTRACT of Patent cases; by T. M. Goodeve. *See* PATENTS.

ACADEMIE des Sciences. *See* TRANSACTIONS.

ACCIDENTS in Mines; by A. Bagot. *See* MINES.

ACHARD, A., Lowering of the Flood Level in the Lake of Constance. *See* RIVERS.

— Hydraulic Wheels. *See* HYDRAULICS.

— Transmission and Distribution of Power to a Distance. (French.) *See* MECHANICS.

— — — — — by means of Electricity. (French.) *See* ELECTRICITY.

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ACOUSTICS, applied to Construction; by W. F. Barrett. *See* BUILDING.

ACQUISITION of Railways by the States; by F. T. Haggard. *See* RAILWAYS.

ACTION of Forces on the Crank; by W. Pole. *See* STEAM ENGINE.

ACTION of Propellers; by W. J. M. Rankine. *See* STEAM SHIPS.

ADAMS, W., Geological Features of South Wales Coalfield. *See* COAL.

ADAMS, W. B., Road Progress. *See* ROADS.

ADAMSON, D., Iron and Steel for constructive purposes. *See* IRON.

ADCOCK, T., Engineers' Pocket Book. *See* MECHANICS.

ADDRESSES, *as under* :—

British Association, Mechanical Section; by F. J. Bramwell. 8vo. *London* 1872.

British Association of Gas Managers; by R. P. Spice, President. *London* 1877.

Co-operative Societies' Conference; by T. Brassey. 8vo. *London* 1874.

French Society of Civil Engineers; by A. Gottschalk, President. 8vo. *Paris* 1881.

Institution of Civil Engineers; by J. Abernethy, President. 8vo. *London* 1881.

— — — — by W. Cubitt, President. 8vo. *London* 1850.

— — — — by J. Fowler, President. 8vo. *London* 1866.

— — — — by C. H. Gregory, President. 8vo. *London* 1868.

— — — — by T. Hawksley, President. 8vo. *London* 1872.

— — — — by G. R. Stephenson, President. 8vo. *London* 1876.

— — — — by C. B. Vignoles, President. 4to. *London* 1870.

Institution of Civil Engineers of Ireland; by B. B. Stoney, President. 8vo. *Dublin* 1872.

Iron and Steel Institute; by C. W. Siemens, President.

Philosophical Institution, Canterbury, New Zealand; by E. Dobson. 4to. *Christchurch* 1866.

Royal Institution of Cornwall; by W. J. Henwood. 8vo. *Truro* 1869 and 1871.

Social Science Congress; by T. Hawksley, President. *London* 1876.

Society of Engineers; by R. P. Spice. *London* 1878.

ADELSBERG Grotto. *See* GROTTO.

ADHESION, Locomotive Adhesion. *See* LOCOMOTIVES.

ADIRONDACK, Topographical Survey of Adirondack Wilderness. *See* UNITED STATES.

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ADMIRALTY Instructions as to Steam Ships. *See* STEAM SHIPS.

ADMIRALTY Trials of Steam Ships. *See* STEAM SHIPS.

ADMINISTRATIVE Law; by — Cotelle. *See* LAW.

AENEIDEA; by J. Henry. 8vo. *Dublin* 1878.

AERONAUTIC Specifications. *See* PATENTS.

AFRICA, *as under* :—

Map of Southern Africa; by C. E. Solomon. *Capetown* 1875.

Map of Cape Colony, showing Railways. *Cape Town* 1872.

Borings executed in the Sahara. *See* BORING.

AGRICULTURE, *as under* :—

Construction of Agricultural Implements; by G. Marié.

How to Farm profitably on Stiff Clays; by J. J. Mechi. 8vo. *London*.

The Land Question; by T. Aveling. 8vo. *Rochester* 1880.

Rise and Progress of the Agricultural Implement Trade; by James Howard. 1879.

AGRICULTURE, *as under (continued):—*

Royal Agricultural Society. *See* TRANSACTIONS.

——— Chemical Committee. *See* TRANSACTIONS.

Trial of Agricultural Implements, Chelmsford; by W. G. Cavendish. 8vo. *London* 1857.

Ploughs and Ploughing; by J. E. Ransome. 8vo. *Edinburgh* 1865.

Double Furrow Ploughs; by J. E. Ransome. 8vo. *Ipswich* 1879.

AHRENBERG, H. E., Swedish Iron Marks. *See* IRON.

AID Book to Engineering enterprise Abroad. *See* ENGINEERING.

AIDE-MEMOIRE for Royal Engineers; by A. C. Cooke. *See* ENGINEERING.

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AIX, Report of the Polytechnic School. *See* GERMANY.

ALBAN, E., High-Pressure Steam Engine. *See* STEAM ENGINE.

ALBUM des chemins de fer; by G. Cornet. *See* RAILWAYS.

ALLAN, A., Roof Lamp for Railway Carriages. *See* RAILWAYS.

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ALLOYS, Testing of Metals and Alloys. *See* METALLURGY.

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ALMANAC, British Almanac for 1848. *London*.

ALMANAC, Railway Banking Almanac. *See* RAILWAYS.

AMBULANCE Wagons of Northern Railway; by A. Mathias. *See* EXHIBITIONS.

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- ANEROID Barometer; by E. J. Dent. *See* INSTRUMENTS.
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- ARCHITECTURE**, *as under* :—
- Gwilt's Encyclopædia of Architecture, by W. Papworth. Svo. London 1876.
- Art of Architecture as applied to Military Buildings; by J. P. Seddon. Folio. Chatham 1874.
- ARGUMENTS against the use of Self-acting Brakes. *See* BRAKES.
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- ARTS and Science Dictionary. *See* DICTIONARIES.
- ASBESTOS, and its use as steam-engine packing; by St. J. V. Day. Svo. Glasgow 1872.
- ASHBURY, T., Liverpool and Manchester Railway. *See* RAILWAYS.
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ASTON, T., Patent Inventions. *See* PATENT LAWS.

ASTRONOMY, as under:—

Summary or Index of Struve's Double Stars; by Lord Lindsay. Folio. *Aberdeen* 1876.

Mauritius Expedition for observing the Transit of Venus in 1874; by Lord Lindsay. Folio. *Aberdeen* 1877.

ATHERTON, C., Marine Engine Construction and Classification. *See* STEAM ENGINE.

— Capability of Steam Ships. *See* STEAM SHIPS.

ATKINSON, J. J., Gases in Coal Mines. *See* COAL.

ATLAS, Handy-Royal; by A. Keith Johnson. *Edinburgh and London* 1880.

ATLAS, Physical, of Natural Phenomena; by A. Keith Johnson. *Edinburgh and London* 1856.

ATMOSPHERIC Railway Brake; by R. D. Sanders. *See* BRAKES.

ATMOSPHERIC Railway. *See* RAILWAYS.

AUCOC, L., Railway Charges, &c. *See* RAILWAYS.

AUSTRALIA, as under:—

New South Wales, Account of the Colony; by C. Robinson. Svo. *Sydney* 1873.

— — — Financial Statement of Colonial Treasurer; by J. Robertson. 4to. *Sydney* 1875.

— — — Internal Communications; by Lieut.-Col. Martindale. Folio. *Sydney* 1858.

— — — Railway Works 1860. Report of Evidence. Folio. *Sydney* 1860.

— — — Statistical Register, from 1850 to 1859. Folio. *Sydney* 1860.

Victoria, Designs Models and Works of the Melbourne Exhibition. *See* EXHIBITIONS.

Victoria, Patent Index, &c. *See* PATENTS.

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AXLEBOXES and Journals with Rolling Friction; by J. B. Vidard. (French.) *See* FRICTION.

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- BATHS and Washhouses; by G. A. Cape. 4to. *London* 1854.
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BIRMINGHAM Directory, 1849.

BIRMINGHAM Education Society, Report. *See* EDUCATION.

BIRMINGHAM Free Libraries Committee, Report 1873 and 1867.

BISHOP, G., Testing of Metals and Alloys. *See* METALLURGY.

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BLACKWELL, S. H., Iron Making Resources of United Kingdom. *See* IRON.

BLAKELEY, Capt., Armstrong Guns. *See* GUNS.

BLAST FURNACES, as under :—

Blast Furnace, by C. Schinz. Translated by W. H. Maw and M. Muller.
London 1870.

Blast for Cupolas, &c., "Soufflerie Aspirante" (French). 8vo. *Paris* 1865.

BLAST FURNACES, *as under (continued)* :—

Apparatus for taking off the Waste Gas in Blast Furnaces ; by E. Langen. 8vo. *Manchester* 1862.

Appropriation of Heat in Blast Furnaces ; by I. Lowthian Bell. 8vo. *Newcastle* 1869.

Chemistry of the Blast Furnace ; by I. Lowthian Bell. 8vo. *London* 1869.

Economy of Fuel in the Blast Furnace ; by I. Lowthian Bell. 8vo. *London* 1872.

Studies of Blast Furnace Phenomena ; by M. L. Gruner, translated by L. D. B. Gordon. 8vo. *London* 1873.

Fire-brick Hot-Blast Stoves ; by E. A. Cowper. 8vo. *London*.

— — — by T. Whitwell. 8vo. *Newcastle* 1869.

Improved Cowper Stove ; by E. A. Cowper. 8vo. *London* 1880.

Hot-Blast Trial, Report. 4to. *Edinburgh* 1843.

BLEACHING, Dyeing, and Printing, Specifications. *See* PATENTS.

BLEACHING of Linen by Mechanical Process ; by N. Sergueeff (French). 8vo. *Paris* 1878.

BOARD of Trade Returns on Brakes. *See* BRAKES.

— — — on Railways. *See* RAILWAYS.

BÜCKLER, G. A., *Theatrum Machinarum Novum*. *See* MACHINERY.

BOILER and Factory Chimneys, by R. Wilson. *See* BUILDING.

BOILERS, *as under* :—

Anti-incrustator for Steam Boilers, Baker's. 8vo. *London* 1866.

Corrugated Retort Boiler ; by S. R. Smyth. 8vo. *London* 1861.

Harrison Boiler ; by J. Harrison. 8vo. *Philadelphia* 1870.

Boiler Incrustation ; by F. J. Rowan. 8vo. *London* 1876.

Boiler Explosions, Report of House of Commons Committee. Folio. *London* 1871.

Boiler Explosion at Linthorpe Iron Works, Middlesbrough ; by J. Head. 8vo. *Newcastle* 1873.

Memorial to Home Secretary on Boiler Explosions ; by Manchester Steam Users' Association. 4to. *Manchester* 1869.

Boiler Explosion Records ; by E. B. Marten. 8vo. *London* 1866–1874.

— — — Appendix ; by E. B. Marten.

Boiler Explosions ; An address to the South Staffordshire Mill and Forge Managers' Association ; by E. B. Marten. 8vo. *Stourbridge* 1880.

Boiler Explosions ; by Z. Colburn. 8vo. *London* 1860.

Boiler Insurance, Association of North of France. (French.) 8vo. *Lille*, 1874.

— — — Midland Inspection and Assurance Association, Reports. 8vo and folio. *Stourbridge* 1871–1875.

— — — National Co., Reports. 8vo. *Manchester* 1865–1874.

BOILERS, *as under (continued) :—*

Boiler Insurance and Steam Power Co., Manchester, Reports. 8vo. *Manchester* 1865–1873.

Manchester Steam Users' Association for Prevention of Steam Boiler Explosions, Reports from 1865. 8vo. *Manchester*.

Normandy Steam Users' Association, Report for 1877 (French).

Economy of Fuel; by E. Bède. (French.) *See FUEL*.

Description and Working of Elephant or French Boilers; by the North of France Steam Boiler Association. (French.) 8vo. *Lille* 1874.

Smoke Consuming Grates for Boilers; by — Ten-Brink (French). 8vo. *Paris* 1877.

Strength and Explosions of Locomotive Boilers; by W. Fairbairn (British Association Reports). 8vo. *London* 1854.

Kitchen and Hot-Water Boiler Explosions; by S. B. Goslin. 8vo. *London* 1881.

Construction of Marine Boiler; by C. Wye Williams. 8vo. *London* 1862.

Marine Boilers of the United States; by B. H. Bartol. 8vo. *Philadelphia* 1851.

Prevention of Smoke in Boilers; by T. S. Prideaux. 12mo. *London* 1855.

Steam Boilers; by R. Armstrong. 8vo. *London* 1865.

Boilers and Steam Engines, Questions affecting the efficiency of; by J. Head. 8vo. *Stockton* 1869.

Wear and Tear of Boilers; by F. A. Paget. 8vo. *London* 1865.

Report of Admiralty Committee on Deterioration of Boilers. Folio. *London* 1880.

Miller's American Safety Boiler. 8vo. *Newport* 1870.

Water Tube Boilers; by J. F. Flannery. 4to. *London* 1876.

Whittle Boiler, Description; by L. E. Fletcher. 8vo. *Birmingham*.

BOLEHALL Water Works. *See HYDRAULICS*.

BOMBAY Sassoon Mechanics' Institute. *See TRANSACTIONS*.

BOOKS, &c., Specifications. *See PATENTS*.

BORING, *as under :—*

Boring Artesian Wells in Oriental Sahara; by C. Laurent. (French.) 8vo. *Paris* 1857.

Borings executed in Oriental Sahara; by C. Laurent (French). 8vo. *Paris* 1857.

Rock Drilling; by R. Schram. 4to. *London* 1878.

Exploratory Boring; by C. Laurent-Degousée. (French). 8vo. *Paris* 1860.

McKean's Rock Boring Machinery; by P. and W. MacLellan. 4to. *Glasgow*.

BOUCHERIE'S process for Preserving Timber. *See TIMBER*.

BOULTON & Watt, Steam Engine at Gwennap. *See PATENTS*.

BOURGOUGNON, R., Self-acting Brake for Cranes and Hoists. *See BRAKES*.

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- BRAKES**, *as under* :—
- Arguments against the use of Self-Acting Continuous Railway Brakes; by F. T. Haggard. 8vo. 1880.
- Atmospheric Railway Brake; by R. D. Sanders. Folio. *Birmingham* 1875.
- Automatic Friction Railway Brake; by L. Becker (German). 8vo. *London* 1857.
- Board of Trade Returns on Brakes, 1879. Folio. *London* 1880.
- Continuous Railway Brakes, recent arrangements of; by St. J. V. Day. 8vo. *London* 1875.
- Experiments on Lancashire and Yorkshire Railway; by Capt. D. Galton. Folio. 1880.
- Guerin's Self-Acting Railway Brake.
- How the Brake Question is being Manipulated in England. 8vo. *Glasgow* 1877.
- Le Chatelier Counter-pressure Railway Brake (French). 4to. *Paris* 1869.
- — — by L. Le Chatelier (French). 8vo. *Paris* 1869.
- — — supplementary; by L. Le Chatelier (French). 8vo. *Paris* 1869.
- — — Railway Economy: Use of Counter-pressure Steam in the Locomotive Engine as a Brake; by L. Le Chatelier. 8vo. *Edinburgh* 1869.
- Lyons Railway, Experiments on Brakes; by G. Marié (French).
- Newall's Railway Brake. 8vo. *Manchester* 1854.
- Railway Brake Conference; by D. Banderali (French). 8vo. *Paris* 1879.
- Sanders & Bolitho Continuous Brake. 4to. *London* 1879.
- Self-acting Brake for Cranes and Hoists, dispensing with Ratchet and Pawl; by R. Bourgougnon. (French.) 8vo., two editions. *Paris* 1874 and 1878.
- Westinghouse Railway Brake. 4to. *London* 1878.
- BRAMWELL, F. J., Address to British Association. *See* ADDRESSES.
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BRAMWELL, F. J., Protection for Inventions. *See* PATENTS.

— Quick Steam Launches. *See* STEAM LAUNCHES.

BRANDS, Swedish Iron Marks. *See* IRON.

BRASSEY, T., Co-operative Societies' Conference. *See* CO-OPERATION.

BRASSEY, Mr., Life and Labours of; by A. Helps. 8vo. *London* 1872.

BRAZILIAN Railways in 1879; by F. P. Passos. *See* RAILWAYS.

BREAKWATERS. *See* HARBOURS.

BREECH-LOADING. *See* FIRE-ARMS.

BRESSE, —, *Hydraulique* (Cours de Mécanique appliquée, pt. 2). *See* HYDRAULICS.

BRETT, —, Electric Telegraph. *See* TELEGRAPHY.

BRICKS and Tiles, Specifications. *See* PATENTS.

BRICKMAKING; by H. Chamberlain. 8vo. *London* 1856.

BRIDLE Roads and Passes in Canterbury District; by E. Dobson. *See* NEW ZEALAND.

BRIDGES AND GIRDERS, as under :—

Solid Beams and Girders; by W. Donaldson. 8vo. *London* 1872.

Strength and Deflection of Beams; by W. Pole. 8vo. *London* 1850.

Bridges; by F. Jenkin. *Edinburgh* 1878.

Girder making and bridge Building in Wrought Iron; by E. Hutchinson. 8vo. *London* 1879.

Britannia and Conway Tubular Bridges; by E. Clark. 2 vols. 4to, and folio plates. *London* 1850.

Cast and Wrought-Iron Bridges and Girders; by W. Humber. Folio. *London* 1857.

Construction of Bridge Girders; by F. Laissle and A. Schübler (German). 2 vols. 8vo. *Stuttgart* 1876.

Practical treatise on Bridge Building; by S. Whipple. *New York* 1875.

Long Span Railway Bridges; by B. Baker. *London* 1867.

Railway Bridges of small span; by W. Anderson. 8vo. *Dublin* 1876.

Tubular and other Iron Girder Bridges; by G. D. Dempsey. 8vo. *London* 1871.

Works in Iron; Bridge and Roof Structures; by E. Matheson. 8vo. *London* 1877.

Wind Pressure upon Iron Bridges and Piers; by H. Zimmermann (German). 8vo. *Berlin* 1880.

Wrought-Iron Bridges; by J. H. Latham. *Cambridge* 1858.

Construction of Wrought-Iron Bridges; by W. C. Unwin. Folio. *Chatham* 1871.

Iron Bridges and Roofs; by A. Ritter (Sankeys' translation). 8vo. *London* 1879.

Effect of Impact upon Wrought Iron Girders; by W. Fairbairn. 4to. *London* 1864.

BRIDGES AND GIRDERS, as under (continued):—

On the Theory of Strains in Girders, &c.; by B. B. Stoney. *See MECHANICS.*

On the Distribution of Stress in Beams; by W. C. Unwin. Folio. *Chatham* 1868.

Cylinder Foundations of Rochester Road Bridge; by C. Fox. 8vo. *London* 1865.

Pneumatic Method of Constructing Foundations of Rochester Road Bridge; by J. Hughes. 4to. *London* 1851.

Crumlin Viaduct, by H. N. Maynard. *Crumlin* 1862.

Kehl Bridge over the Rhine; by A. Perdonnet. (French.) 8vo. *Paris* 1861.

Malahide Viaduct; by W. Anderson. 8vo. *Dublin* 1862.

Bridge over the Gorai River, Bengal; by B. Leslie. 8vo. *London* 1872.

BRITANNIA and Conway Tubular Bridges. *See BRIDGES.*

BRITISH Association for the Advancement of Science. *See TRANSACTIONS.*

BRITISH Association of Gas Managers. *See TRANSACTIONS.*

BRITISH Manufacturing industries; by G. P. Bevan. *See MACHINERY.*

BROWN, T., and T. J. Main, Steam Indicator and Dynamometer. *See STEAM.*

BRUNEL, I. K., Life of; by I. Brunel. 8vo. *London* 1870.

BRUNOT'S Recording Indicator for the Running of Trains. *See RAILWAYS.*

BRUNTON, W., Ventilation of Coal Mines. *See MINES.*

BRUSHING and Sweeping, Specifications. *See PATENTS.*

BUCHANAN, R., Millwork and Machinery. *See MACHINERY.*

— Essay on Shafts of Mills. *See MACHINERY.*

BUILDING, as under :—

Acoustics applied to construction of Buildings; by W. F. Barrett. Folio. *Chatham* 1869.

Application of Cast and Wrought Iron to Building purposes; by W. Fairbairn. 8vo. *London* 1857–1858.

Child's Public Ledger Building, Philadelphia. 8vo. *Philadelphia* 1868.

Chimney Construction; by R. M. Bancroft. 8vo. 1878.

Boiler and Factory Chimneys; by R. Wilson. *London* 1877.

Dictionary of Building Terms. *See DICTIONARIES.*

Erection of Fire-proof Houses in Flats; by A. Ashpitel and J. Whichcord. 8vo. *London* 1855.

Fall of Cotton Mill at Oldham (Parliamentary Paper). Folio. *London* 1845.

Building Materials; by W. Dent. Folio. *Chatham* 1868, 1872, 1878.

Notes on Building Construction. 3 vols. 8vo. *London* 1875.

Subsoil Drainage, Foundations, Walls, Openings, and Arches; by Captain W. R. Slacke. Folio. *Chatham* 1875.

Warming and Ventilating of Buildings; by C. J. Richardson. *London* 1837.

— — — by T. Tredgold. *London* 1836.

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Ventilating Fireplaces; by Capt. Douglas Galton. Folio. *London* 1872.

BUILDING, as under (*continued*):—

Wooden and Fire-proof Floors; by J. F. Marsh. Folio. *Chatham* 1878.

Zinc as Applied to Roofing Purposes; by F. Braby. *London* 1869.

Building Trades and Building Construction; by Capt. Seddon. Folio. *Chatham* 1873.

Stability of Foundations; by Poncelet (French). *Paris* 1840.

BULLOCK, J. S., Chemical Analysis. See **CHEMISTRY**.

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BURGH, N. P., Land and Marine Engines and Boilers. See **STEAM ENGINE**.

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— and H. Law, Civil Engineering. See **ENGINEERING**.

BURY, W., Power and Speed of Steam Vessels. See **STEAM SHIPS**.

BYRNE, O., Elements of Practical Mechanics. See **MECHANICS**.

C.

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CAISSON, Sliding, at Keyham Dockyard. See **DOCKYARDS**.

CALCULATING Machine, Swedish. See **INSTRUMENTS**.

CALENDAR of Royal Indian Engineering College. See **INDIA**.

CAMUS, M., Treatise on the Teeth of Wheels. See **MACHINERY**.

CANADA, as under:—

Recollections of Canada; by Lieuts. Carlile and Martindale. Folio. *London* 1857.

Ontario, Commissioner of Agriculture and Arts, Annual Report from the Public Works Department. 8vo. *Toronto* 1868.

Emigration to Ontario, and Report of Commissioner of Agriculture. 8vo. *Toronto* 1869.

CANALS, as under:—

Inland Navigation; by — Mary (French). Folio. *Paris* 1850.

Canal Navigation with Steam Power; by W. Fairbairn. 8vo. *Manchester* 1831.

Canal and River Engineering; by D. Stevenson. *Edinburgh* 1872.

Canal and River Engineering; by D. Stevenson. Folio. *Chatham* 1877.

Canals, Reservoir Dams, &c.; by R. Aitken. Folio. *Chatham* 1872.

Canals, Roads, Railways, and Ports of France. See **ROADS**.

Suez Canal; by A. Lavalley (French). 8vo. *Paris* 1866.

— — — Report; by Sir J. Hawkshaw. Folio. *London* 1863.

Towing by Wire Rope on Canals; by M. Eyth (French). 4to. *Brussels* 1869.

CANGIANO, L., Naples Water Supply. See **HYDRAULICS**.

CANTERBURY, New Zealand. See **NEW ZEALAND**.

CANTERBURY Water Supply. See **HYDRAULICS**.

CAPABILITY of Steam Ships; by C. Atherton. See **STEAM SHIPS**.

CAPE Colony, Map, showing Railways. See **AFRICA**.

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- CAXTON CELEBRATION, Catalogue of Collection. 8vo. London 1877.
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- Reviews on Portland Cement; by H. Reid. 8vo. London 1878.
- Effect of Sulphates on Lime Mortar; by Graham Smith. 8vo. 1880.
- Experiments on Portland and Roman Cement; by J. B. White. 8vo. London 1852.
- Strength of Limes, Cements, Mortars, &c.; by C. W. Pasley. London 1838.
- Portland Cement, its manufacture and uses; by H. Reid. London 1877.

CEMENTS AND MORTARS, *as under (continued):—*

Masonry and Stone Cutting ; by E. Dobson. *London* 1859.

Cements, Limes, Mortars, Concretes, &c. : by G. R. Burnell. *London* 1857.

Cements and Mortars ; by J. L. Vicat (Smith's translation). 8vo. *London* 1837.

CENSUS in Great Britain, 1851, Result. 8vo. *London* 1853.

CENTENNIAL Exhibition, 1876, Contributions. *See* EXHIBITIONS.

CENTRIFUGAL PUMPS. *See* HYDRAULICS.

CHAINS, Weldless Steel and Iron Chains ; by — David and — Damoiseau (French). 8vo. *Paris* 1878.

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See IRON.

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CHATHAM Lectures, 1867-1877. 4to. *Chatham*.

CHAUDIÈRES à Bouilleurs inférieurs et à Réchauffeurs latéraux. *See* BOILERS.

CHEAP Railways for the Colonies ; by J. A. Longridge. *See* RAILWAYS.

CHEMINS de fer en Amérique. *See* RAILWAYS.

CHEMISTRY, *as under :—*

Chemical Analysis ; by J. S. Bullock. 8vo. *London* 1843.

Chemical Reports and Memoirs (Cavendish Society). 8vo. *London* 1848.

Chemical and Physical Geology (Cavendish Society). *See* GEOLOGY.

Chemical Method of Notation, &c. ; by A. Laurent (Cavendish Society, Odling's translation). 8vo. *London* 1854.

Chemistry of the Blast Furnace ; by I. L. Bell. *See* BLAST FURNACES.

Chemistry of the Steam Engine ; by T. Craddock. *See* STEAM ENGINE.

Chemists' Pocket-Book ; by T. Bayley. 12mo. *London* 1878.

Chemical Philosophy ; by John Dalton. Part I., 2nd ed., 8vo. *London* 1842.

— — — Part I., vol. 2, 8vo. *Manchester* 1827.

Life and Works of Cavendish ; by Dr. G. Wilson (Cavendish Society). 8vo. *London* 1849.

Life of Dalton ; by Dr. Henry (Cavendish Society). 8vo. *London* 1854.

Gmelin's Handbook of Chemistry (Cavendish Society, Watts' translation). 11 vols., 8vo. *London* 1856.

Lehmann's Physiological Chemistry (Cavendish Society, Day's translation). 3 vols., 8vo. *London* 1851-54.

CHEMISTRY, as under (*continued*) :—

- Mechanism of Chemistry ; by — Berthelot. 2 vols. (French). *Paris* 1879.
- Soda Manufacture on the Tyne ; by R. C. Clapham. 8vo. *Newcastle* 1869.
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COAL AND COKE, *as under* :—

Coal Combustion ; by C. Wye Williams. 4to. *Liverpool* 1841.

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Coal Cutting Machinery ; by W. J. Clapp. 4to. *London* 1873-1874.

Coal Economy, for domestic purposes ; by E. B. Marten. *Wolverhampton* 1873.

Northumberland and Durham Coalfield, Map ; by W. Oliver. Folio. *Newcastle* 1851.

Coal Gas. *See* GAS.

South Wales Coalfield, Geological Features ; by W. Adams. 8vo. *Cardiff* 1872.

Coal Mines. *See* MINES.

Coal Mining. *See* MINES.

Coal Supply ; by Sir W. G. Armstrong (Address to North of England Institute of Mining Engineers). 8vo. *Newcastle* 1863.

Archæology of the Coal Trade ; by T. J. Taylor. 8vo. *Newcastle* 1852.

Trials of Lancashire and Cheshire Coals ; by Manchester Steam Boiler Association. 8vo. *Manchester* 1868.

Coal Washing ; by A. Bérard (French). 8vo. *Paris* 1856.

Coal Working by Long Wall ; by G. Fowler. 8vo. *Newcastle* 1870.

Desulphurisation of Coke, Claridge and Roper's Process ; by R. S. Roper. 8vo. *Newport* 1858.

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- COTTON Manufacture of Great Britain; by A. Ure. 2 vols., 8vo. *London* 1836.
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- Improved Cowper Stoves. *See* BLAST FURNACES.
- COX, E. T., Geological Survey of Indiana. *See* UNITED STATES.
- CRADDOCK, T., Chemistry of the Steam Engine. *See* STEAM ENGINE.
- CRANE, Twenty-Ton; by W. Anderson. 8vo. *Dublin* 1868.
- CRANK, Action of Forces on the Crank; by W. Pole. *See* STEAM ENGINE.
- CREOSOTING Process for Timber, Bethell's. *See* TIMBER.
- CROMPTON, R. E. B., Electric Light for industrial purposes. *See* ELECTRICITY.
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D.

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- DAMS for Reservoirs, Canals, &c. *See* CANALS.
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- DATUM-LEVEL of Ordnance Survey, British Association Report; by J. N. Shoolbred. 8vo. 1879.
- DAVID, —, Weldless Steel and Iron Chains. *See* CHAINS.
- DAY, St. J. V., Asbestos. *See* ASBESTOS.
- Early Use of Iron. *See* IRON.
- Papers on Patents. *See* PATENTS.
- DECIMAL Measures. *See* MEASURES.
- DECLINE of Science; by C. Babbage. 8vo. *London* 1830.
- DEGHILAGE, —, Locomotives at Vienna Exhibition. *See* LOCOMOTIVES.
- DEMPSEY, G. D., Iron Girder Bridges. *See* BRIDGES.
- Machinery of Nineteenth Century. *See* MACHINERY.
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- DEPTH, Means of determining Depth of Sea; by C. W. Siemens. 8vo. *London* 1876.
- DERIVATION of Elongated Projectiles; by Major Owen. *See* GUNS.
- DESCRIPTIVE history of the Steam Engine; by R. Stuart. *See* STEAM ENGINE.
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- DICTIONARIES**, *as under* :—
- Arts and Sciences; by C. H. Laboulaye (French). 4 vols., 4to. *Paris* 1877.
- Arts, Manufactures, and Mines (Ure's); by R. Hunt. 4 vols. *London* 1878.
- Building, Engineering &c., Terms; by J. Weale. 2 vols., 12mo. *London* 1850.
- Dutch; by H. Picard. 2 vols., 8vo. 5th ed. *Gouda* 1877.
- Engineering, Spon's. 3 vols. *London* 1874.
- English Language; by R. G. Latham. *London* 1881.
- French-English and English-French; by Smith and Hamilton. 2 vols.
- German-English and English-German (Flügel's); by C. A. Feiling, A. Heimann, and J. Oxenford. 2 vols., 8vo. *London*.
- Italian-English and English-Italian (Baretti's); by J. Davenport and G. Comelati. 2 vols., 8vo. *London* 1854.
- Mathematical and Philosophical; by P. Barlow. 8vo. *London* 1814.
- Mechanics' Pocket Dictionary; by W. Grier. 8vo. *Glasgow* 1837.
- Russian-French-German-English, and English-Russian-French-German; by C. P. Reiff. 2 vols., 8vo. 3rd ed. *Carlsruhe* 1876-1879.
- Science; by G. F. Rodwell. *See* PHYSICS.

DICTIONARIES, as under (*continued*):—

Spanish-English and English-Spanish (Neuman and Baretti's); by D. M. Seoane. 2 vols., 8vo. *London* 1854.

Technical Terms relating to Iron (French, German, and English); by A. Tolhausen. 8vo. *London* 1870.

Technological (English, French, and German); by A. Tolhausen and — Gardissal. 3 vols., 8vo. *Paris* 1864.

Universal Information, Beeton's. 8vo., 2 vols. *London*.

DIRCKS, H., History of Electro-Metallurgy. See **METALLURGY**.

— History of Perpetual Motion. See **PERPETUAL MOTION**.

— Life and Times of Marquis of Worcester. See **WORCESTER**.

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DIRECT-ACTING Hydraulic Machinery; by R. H. Tweddell. See **HYDRAULICS**.

DISC, Rotation of Elastic Disc. See **MECHANICS**.

DIVING Apparatus; by Siebe and Gorman. *London* 1878.

DOBRONRAROFF, Turbine-Fourneyron. See **HYDRAULICS**.

DOBSON, E., Address to Philosophical Institute, Canterbury. See **NEW ZEALAND**.

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— Masonry and Stone Cutting. See **CEMENTS**.

DOCKS, as under:—

Janicki's Floating Dock; by H. Simon. 8vo. *Glasgow* 1872.

Mersey Docks and Harbour, Historical and Descriptive Sketch; by J. J. Birckel. 4to. *London* 1865.

DOCKYARDS, as under:—

Extension Works, Chatham Dockyard; by E. A. Bernays. Folio. *Chatham* 1872.

Sliding Caisson at Keyham Dockyard; by W. Fairbairn. 8vo. *London* 1857.

DONALDSON, W., Solid Beams and Girders. See **BEAMS**.

DORTMUND Mining Engineers' Society. See **TRANSACTIONS**.

DOUBLE-Furrow Ploughs; by J. E. Ransome. See **AGRICULTURE**.

DOUGLAS, J. C., Manual of Telegraph Construction. See **TELEGRAPHY**.

DOWNES, C., Exhibition Building, London 1851. See **EXHIBITIONS**.

DOWNING, S., Drainage of Haerlem Lake. See **DRAINAGE**.

— Elements of Practical Construction. See **MECHANICS**.

— Practical Hydraulics. See **HYDRAULICS**.

DRAINAGE. See **SEWAGE**.

DRAINAGE of Haerlem Lake; by S. Downing. 4to. *Dublin* 1855.

DRAINAGE of London; by J. W. Bazalgette. 8vo. See **SEWAGE**.

DRILLING and Tapping Machines for Screw-Stay holes. See **LOCOMOTIVES**.

DROIT des Inventeurs; by É. Barrault. See **PATENTS**.

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- DUD DUDLEY'S Metallum Martis. 12mo. (Reprint 1851.) *London* 1665.
 — — — — *See* PATENTS.
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- DUTCH Royal Institute of Engineers. *See* TRANSACTIONS.
- DWELLINGS, Schools, &c., of Miners in North of France; by E. Vuillemin (French). 1879.
- DWELSHAUVERS, V., Mécanique appliquée. *See* MECHANICS.
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E.

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- EDUCATION, as under:—**
- Education of Civil and Mechanical Engineers; by F. Jenkin. 8vo. *Edinburgh* 1868.
- Livery Companies' Report on Technical Education. 8vo. *London* 1878.
- Industrial and Professional Education; by A. Morin and H. Tresca. (French.) 8vo. *Paris* 1862.
- Education Society, Birmingham, Report. 8vo. *London* and *Birmingham* 1868.
- University College, London, Regulations &c. 8vo. 1880.
- EFFECT of Impact on Wrought-Iron Girders; by W. Fairbairn. *See* BRIDGES.
- ELASTIC Disc, Stresses produced by rapid Rotation. *See* MECHANICS.
- ELASTICITY and Strength of Materials. *See* MECHANICS.
- ELASTISCHE Nachwirkung; by H. Streintz. *See* MECHANICS.
- ELDER, J., Memoir; by W. J. M. Rankine. 8vo. *Edinburgh* and *London* 1871.

ELECTRICITY, *as under* :—

Electricity &c., Specifications. *See* PATENTS.

Electric Light for Industrial Uses ; by R. E. B. Crompton. 8vo. *London* 1880.

Electric Lighting and its Practical Application ; by J. N. Shoolbred. 8vo. *London* 1879.

Electric Lighting ; by H. Fontaine. (French). *Paris* 1877.

Practical Electric Lighting ; by K. W. Hedges.

Principal Systems of Electric Light in use in England and the United States, by K. W. Hedges. 8vo. *London* 1880.

Present state of Electric Lighting ; by J. N. Shoolbred. 8vo. *London* 1878.

Dynamo-Electric Current, in its application to Metallurgy, to Horticulture, and to Locomotion ; by C. W. Siemens. 8vo. *London* 1880.

Dynamo-Electric Current, and means to improve its Steadiness ; by C. W. Siemens. 4to. *London* 1880.

Gas and Electricity as Heating Agents ; by C. W. Siemens. 8vo. *London* 1881.

Transmission and Distribution of Power to a Distance by means of Electricity ; by A. Achard. (French.) 8vo. *Paris* 1879.

Electrical Measurements. 8vo. *Chatham* 1867.

Electrical Resistance Thermometer and Pyrometer ; by C. W. Siemens.

Electrical Standards ; by F. Jenkin. 8vo. *London* 1873.

Electricity and Magnetism ; by F. Jenkin. 8vo. *London* 1878.

Residual Charge of Leyden Jar ; by J. Hopkinson. 8vo. *London* 1876.

Electro-Motive Force ; by J. Hopkinson. 8vo. *London* 1876.

Electro-Metallurgy. *See* METALLURGY.

Lessons in Electricity ; by J. Tyndall. 8vo. *London* 1876.

Notes on Lectures on use of certain Electrical Apparatus. Folio. *Chatham*.

Ronalds Catalogue of works on Electricity, Magnetism, Electric Telegraphs, &c. 8vo. *London* 1881.

ELEMENTS of Geology ; by Sir C. Lyell. *See* GEOLOGY.

ELEMENTS of Geometry ; by J. Leslie. *See* GEOMETRY.

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ELEMENTS of Practical Construction ; by S. Downing. *See* MECHANICS.

EMERY, C. E., Steam Machinery in Steamer Gallatin. *See* STEAM ENGINE.

EMPLOI de l'Acier dans les Constructions ; by J. Barba. *See* STEEL.

EMPLOYERS, Foremen, and Draughtsmen's Association ; Anniversary Dinner and Report, 1880. 8vo. *Manchester* 1880.

ENGINEERING, *as under* :—

Aid Book to Engineering Enterprise Abroad ; by E. Matheson. 8vo. *London* 1878.

Aide-Mémoire for Royal Engineers ; by A. C. Cooke. 8vo. *London* 1876.

ENGINEERING, *as under (continued):—*

Civil Engineering of North America; by D. Stevenson. 8vo. *London* 1868.

Civil Engineering; by W. J. M. Rankine. *London* 1877.

— — — by H. Law and G. R. Burnell. (D. K. Clark.) 12mo. *London* 1881.

Der Ingenieur; by J. Weisbach. *See* TABLES.

Lives of the Engineers; by S. Smiles. 5 vols. *London* 1878.

Engineering Precedents for Steam Machinery; by B. F. Isherwood. *See* STEAM SHIPS.

Canal and River Engineering; by D. Stevenson. *Edinburgh* 1872. *See* CANALS.

Repertory of Technical Literature; by B. Kerl (German). *Leipzig* 1870-79.

Engineer and Machinist's Assistant. 2 vols., folio. *Edinburgh and London* 1850.

Engineering at Exhibitions. *See* EXHIBITIONS.

Engineers' Pocket Book. *See* MECHANICS.

Useful Information for Engineers; by W. Fairbairn. 3 vols., 8vo. *London* 1866.

Smeaton's Reports on Engineering. 2 vols., 4to. *London* 1872.

The Engineer. *See* JOURNALS.

Engineering. *See* JOURNALS.

Civil Engineering and Machinery, in Exhibition of 1851. *See* EXHIBITIONS.

Rise and Progress of Civil and Mechanical Engineering; by W. Fairbairn. 8vo. *Derby* 1859.

Engineering and Engineers; by Lieut.-Col. Martindale. 8vo. *Quebec* 1871.

Spon's Engineering Dictionary. *See* DICTIONARIES.

Weale's Dictionary of Engineering Terms. *See* DICTIONARIES.

Engines, Air, Gas &c., Specifications. *See* PATENTS.

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ENSEIGNEMENT, Organisation de l'Enseignement Industriel et de l'Enseignement Professionnel; by A. Morin and H. Tresca. *See* EDUCATION.

ERECTION of Fire-proof Houses in Flats. *See* BUILDING.

ERICSSON, J., Contributions to the Centennial Exhibition. 4to. *New York* 1876. *See* EXHIBITIONS.

ESTRADAS de ferro do Brazil em 1879; by F. P. Passos. *See* RAILWAYS.

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EXAMPLES of modern Steam, Air, and Gas Engines; by J. Bourne. *See* STEAM ENGINE.

EXHIBITIONS, as under :—

- London, 1851, Report of Commissioners. 2 vols., 8vo. *London* 1852.
- — Building; by Downes and Cowper. Folio. *London* 1852.
- — Civil Engineering and Machinery; by H. Hensman. 12mo. *London* 1852.
- — Lectures on Results. 12mo. *London* 1852.
- — Machines and Tools; by R. Willis. 12mo. *London* 1852.
- — Philosophical Instruments and Processes; by J. Glaisher. 12mo. *London* 1852.
- London 1862, Official Illustrated Catalogue. 4 vols., 4to. *London* 1862.
- — Cyclopædia of Machinery; by D. K. Clark. 4to. *London* 1864.
- — Notice of Objects sent by Austrian State Railway. 4to. *Vienna* 1862.
- — Report on Models, Maps, and Drawings, Exhibited by Minister of Public Works, France (French). 8vo. *Paris* 1862.
- Melbourne, 1880, Models, Designs and Works. 8vo. *Paris* 1880.
- New York, 1854, Report of British Commissioners. Folio. *London* 1854.
- Paris, 1849, Report on French Exhibition of Products of Industry. Folio. *London* 1849.
- Paris, 1855, Report (French). 8vo. *Rouen* 1856.
- — Palace of Industry; by A. Barrault and G. Boidel (French). Folio. *Paris* 1857.
- Paris 1867, English Official Catalogue. 8vo. *London* and *Paris* 1867.
- — General Description (French); by E. Lacroix, &c. 2 vols., 8vo. *Paris*.
- — Report on Public Works in Spain (French). 8vo. *Madrid* 1867.
- — — of United States Commissioners. 6 vols., 8vo. *Washington* 1870.
- Paris 1878, American Engineering.
- — Austrian Northern Railway, Exhibits at Paris 1878 (German). 8vo. and plates. *Vienna* 1878.
- — — — — Permanent Way and Works (German and French). 8vo. *Vienna* 1878.
- — Congress on Industrial Questions (French). 8vo. *Paris* 1879.
- — Catalogue, British Section, and Ministry of Public Works. *Paris* 1878.
- — — Chinese Section.
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- — Mining. See MINES.
- — Emperor-Ferdinand Northern Railway Exhibits. 8vo. *Paris* 1879.
- — Models &c., from Ecole des Ponts et Chaussées.
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- — Terre-Noire Co.'s Exhibits. 4to. *Lyons* 1878.

EXHIBITIONS, *as under (continued) :—*

Philadelphia, 1876, Objects Exhibited by Public Works Department of France.

—— — Contributions to the Centennial Exhibition; by J. Ericsson. 4to.
New York 1876.

—— — Remarkable Public Works; by W. Watson. 8vo.

Rouen, 1855, Report (French). 8vo. *Rouen 1856.*

Vienna, 1873, Description of Machines at Vienna Exhibition; by H. Fontaine
(French). 8vo., and plates folio. *Paris 1874.*

—— — Krupp Steel. *See STEEL.*

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—— — Report on French exhibition of work connected with Bridges, Roads,
and Mines (French). 8vo. *Paris 1873.*

EXPANSION Gear. *See STEAM ENGINE.*

EXPANSION of Saturated Vapours; by W. J. M. Rankine. *See STEAM.*

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F.

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- Breech-loading Rifles, Report of Special Committee (Parl. Paper) Folio. *London* 1869.
- Braendlin-Albini Breech-loading Rifle, Report of Belgian Government. 8vo. *Birmingham* 1867.
- Peabody Rifle. 8vo. *Providence* 1865.
- Martini-Henry Rifle, Report of Special Committee (Parl. Paper). Folio. *London* 1871.
- Diagrams of the Shooting of the Whitworth and the Martini-Henry Rifles ; by Sir J. Whitworth.
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FRENCH and English Dictionary. *See* DICTIONARIES.

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How to obtain Perfect Lubrication; by Pritchard, Offer & Co. 8vo. *London* 1876.

Frictional Resistance of Water on a Surface, Admiralty trials; by W. Froude. 8vo. *London* 1874.

Loss of Friction in the Steam Engine; by W. Pole. *See* STEAM ENGINE.

Railway Axleboxes and Journals fitted with Rolling Friction; by J. B. Vidard. (French.) 8vo. *Paris* 1857-1862.

Experiments on Friction; by A. Morin. *Paris* 1833 and 1835.

FRISSARD, —, Ports. *See* HARBOURS.

FROTTEMENT de Roulement, application aux Boîtes et Fusées d'Essieux des Véhicules des Chemins de fer; by J. B. Vidard. *See* FRICTION.

FROUDE, W., Friction of Water. *See* FRICTION.

— Rolling of Ships, Resistance of Ships, &c. *See* SHIPS.

FUEL, *as under* :—

Coal Combustion; by C. Wye Williams. *See* COAL.

Fuel; by C. W. Siemens. 8vo. *London* 1873.

Fuel, its Combustion and Economy; by D. K. Clark. 8vo. *London* 1879.

Fuel Economy in Reverberatory Furnaces &c.; by T. S. Prideaux. 8vo. *London* 1853.

Economy of Fuel; by E. Bède. (French.) 8vo. *Paris* 1863.

Economy of Fuel comprising Mineral Oils; by W. J. M. Rankine. 8vo. *London* 1867.

Economy of Fuel in the Blast Furnace; by I. L. Bell. *See* BLAST FURNACES.

Oxy-Hydrogen Retort for Economising Fuel; by S. N. Carvalho. 8vo. *Baltimore* 1860.

Power without Fuel, from heat of natural sources; by J. S. Baldwin. 8vo. *New York* 1869.

FURNITURE and Upholstery, Specifications. *See* PATENTS.

G.

GALLAND, N., Pneumatic Malting in Brewing. *See* MALTING.

GALLATIN, Steam Machinery in Steamer Gallatin. *See* STEAM SHIPS.

GALLOWAY, R. L., The Steam Engine and its Inventors. *See* STEAM ENGINE.

GALTON, Capt. D., Ventilating Fire-places. *See* BUILDING.

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— Brake Experiments on Lancashire and Yorkshire Railway. *See* BRAKES.

GALTON, F., Printing Electric Telegraph. *See* TELEGRAPHY.

GALVANISED Iron. *See* IRON.

GANNETT, H., Elevation of Country west of Mississippi. *See* UNITED STATES.

— Meteorological Observations during 1872. *See* UNITED STATES.

GARNIER, P., Martin's Steam-Engine Indicator. *See* STEAM.

GAS, *as under*:—

Gas, Specifications. *See* PATENTS.

Comparative Lighting Power of Gas and Electricity. (French.) 8vo. *Paris* 1878.

Gas and Electricity as Heating Agents; by C. W. Siemens. 8vo. *London* 1881.

Gas Flame Furnace, Beaufumé. 8vo. *Glasgow* 1857. *See* METALLURGY.

Gas Managers' Association, British. *See* TRANSACTIONS.

— — — — Presidential Address; by R. P. Spice. *See* ADDRESSES.

Gases in Coal Mines. *See* MINES.

Manufacture, Use, and Testing of Gas for Illumination; by W. Pole. Folio. *Chatham* 1873.

Manufacture and Distribution of Coal Gas; by S. Clegg. *London* 1868.

Manufacture and Distribution of Coal Gas; by W. Richards. 4to. *London* 1877.

Technical Valuation, Purification, and Use of Coal Gas; by Rev. R. W. Bowditch. 8vo. *London* 1867.

Mechanical Gas Stoking; by R. P. Spice. 8vo. 1876.

Gas Supply, Dublin; by R. P. Spice. 8vo. *London*.

— — Exeter; by R. P. Spice. 8vo. *London*.

— — Gefle; by R. P. Spice. 8vo. *London*.

— — Ipswich; by R. P. Spice. 8vo. *London*.

— — Maidstone; by R. P. Spice. 8vo. *London*.

— — Ryde Arbitration; by R. P. Spice. 8vo. *London*.

Heating by Gas Furnaces; by A. Fichet and S. Périssé. (French.) 8vo. *Paris* 1880.

Examples of modern Steam, Air, and Gas Engines; by J. Bourne. *See* STEAM ENGINE.

Water Gas; by R. P. Spice. 8vo. *London*.

GAUGE Commissioners' Reports &c. *See* RAILWAYS.

GAZAN, A., Physical Constitution of the Sun. *See* PHYSICS.

GAZOGENES, Procédés et Applications du Chauffage par Gazogènes; by A. Fichet and S. Périssé. *See* GAS.

GENERAL Iron Railway. *See* RAILWAYS.

GEOLOGY, *as under* :—

Chemical and Physical Geology; by G. Bischof (Cavendish Society). 2 vols.
8vo. *London* 1854.

Geological Features of South Wales Coal Field. *See* COAL.

Geological Report on Londonderry, &c. *See* IRELAND.

Geological Surveys in United States. *See* UNITED STATES.

Elements of Geology; by Sir C. Lyell. 8vo. *London* 1875.

Principles of Geology; by Sir C. Lyell. 8vo. *London* 1875.

Geology and Mineralogy; by — Dufrénoy. *See* MINERALOGY.

Museum of Geology, Library Catalogue. 8vo. *London* 1878.

GEOMETRY, Elements of; by J. Leslie. 8vo. *Edinburgh* 1809.

GERARD, —, Clock Machinery. *See* MACHINERY.

GERMAN Dictionary (Flügel's). *See* DICTIONARIES.

GIFFARD, H., Injector for Feeding Steam Boilers and Raising Water. *See*
LOCOMOTIVES.

GIFFARD, P., new forms of Piston. (French.) *See* STEAM ENGINE.

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GIRDERS and Bridges. *See* BRIDGES.

GIRDERS, Sections of. *See* IRON.

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GLAISHER, J., Philosophical Instruments in 1851 Exhibition. *See* EXHIBITIONS.

GLASGOW Improvement Trust, operations; by J. B. Russell. 8vo. *Glasgow* 1874.

GLASGOW Philosophical Society. *See* TRANSACTIONS.

GLASS Globes and Cylinders, Resistance to Collapse; by W. Fairbairn and T.
Tate. 4to. *London* 1859.

GLASS, Refractive Indices; by J. Hopkinson. *See* INSTRUMENTS.

GLENELG Pier, and Hays' Wrought-Iron Breakwater. *See* HARBOURS.

GMELIN, —, Handbook of Chemistry. *See* CHEMISTRY.

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— Elements of Mechanism. *See* MECHANICS.

— Steam Engine. *See* STEAM ENGINE.

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GORDON, R., Report on the Irrawaddy River. *See* RIVERS.

— Flow of Water in Open Channels. *See* HYDRAULICS.

GORMAN, W. A., Siebe and Gorman's Diving Apparatus. *See* DIVING.

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GOTTSCALK, A., Presidential Address, French Society of Civil Engineers.
See ADDRESSES.

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GOVERNORS. *See* STEAM ENGINE.

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GROTTO of Adelsberg, description of; by T. Y. Hall. 8vo. *Newcastle* 1855.

GRUNER, M. L., Blast-Furnace Phenomena. *See* BLAST FURNACES.

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GUERIN'S Self-Acting Railway Brake. *See* BRAKES.

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GUNPOWDER Manufacture; by J. A. C. Hay. *See* MACHINERY.

GUNS, as under :—

“Derivation” of Elongated Projectiles; by Major Owen. 8vo. *London* 1870.

Guns and Projectiles; by M. Scott. 8vo. *London* 1862.

Steel and Guns; by Sir J. Whitworth. *See* STEEL.

The Armstrong Gun; by Sir W. G. Armstrong. Letter to the “Times.”
London 1859.

The Armstrong Gun; by Capt. Blakeley. Letter to Secretary of State.
London 1859.

Experiments, Armstrong's and Whitworth's 12-pounder Guns, 1864.

Experiments on Strength of Principal Metals used for Guns; by G. Rosset.
(Italian). 4to., and folio plates. *Turin* 1874.

Manufacture of Guns; by M. S. Jordan. (French.) 8vo. *Paris*, 1871.

Penetration of Iron Armour Plate by Steel Shot; by Captain Noble. Folio.
Chatham 1867.

Projectiles for Artillery; by M. S. Jordan. (French.) 8vo. *Paris* 1871.

Report on Artillery; by Lieut.-Col. Owen. 8vo.

GWILT'S Encyclopædia of Architecture; by W. Papworth. *See* ARCHITECTURE.

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See BRAKES.

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HANOVER Architect and Engineer's Society. *See* TRANSACTIONS.

HARBOURS, *as under* :—

Commercial Ports; by M. L. Barret. (French.) 4to. and folio plates.
Marseilles 1875.

Design and construction of Harbours; by T. Stevenson. *London* 1874.

Glenelg Pier, and Hays' Wrought-Iron Breakwater, South Australia. 8vo.
London 1856.

Mersey Docks and Harbour. *See* DOCKS.

Ports; by — Frissard. (French.) Folio, 2 vols., with plates. *Paris* 1848-1849.

Ports, Canals, Roads, and Railways of France. *See* ROADS.

Seaports of France, description and plans. (French.) 4 Vols. 4to. and folio. *Paris* 1874-1879.

HARLAND, —, Railway Carriages. *See* RAILWAYS.

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HARTIG, D., Handbook of Technology. *See* MECHANICS.

HARTIG, E., Address. *See* ADDRESSES.

— Efficiency of Machine Tools. *See* MACHINERY.

HARTLIB, Memoir of Samuel Hartlib; by H. Dircs. 8vo. *London* 1865.

HAUGHTON, B., Railway Amalgamation. *See* RAILWAYS.

HAUER, J. Ritter von, Wasserhaltungs-Maschinen der Bergwerke. *See*
HYDRAULICS.

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— — — Idaho and Wyoming. *See* UNITED STATES.

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HEATHER, J. T., Mathematical Instruments. *See* INSTRUMENTS.

HEAT, *as under* :—

Contributions to Molecular Physics in the domain of Radiant Heat; by J. Tyndall. *London* 1872.

Heat as a mode of Motion; by J. Tyndall. 8vo., 6th ed. *London*. 1880.

Heat developed by Water when violently agitated; by G. B. RENNIE. 8vo.
London 1856.

HEAT, as under (*continued*):—

- Theory of Heat; by J. C. Maxwell. *London* 1877.
- Mechanical Theory of Heat; by R. Clausius. *London* 1879.
- — — by C. M. Guldberg (Norwegian). *Christiania* 1867.
- Second Law of Thermo-Dynamics; by W. J. M. Rankine. 8vo. *London* 1865.
- Motive Power of Heat; by S. Carnot. (French.) 4to. *Paris* 1878.
- Mechanical Theory of Heat; by G. Zeuner. (French.) *Paris* 1869.
- Thermo-Dynamics of Elastic Fluids; by J. Gill. 8vo. *London* 1860.
- Practical Treatise on Heat; by T. Box. 12mo. *London* 1868.
- Heated Air Engine, Paper and Discussion. 8vo. *London* 1853.
- Heated Air and Steam in Locomotives. *See* LOCOMOTIVES.
- Heating Water and Condensing Steam; by W. Anderson. *See* STEAM.
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— Stresses produced by Rotation of Elastic Disc. *See* MECHANICS.

HOT Blast Stoves. *See* BLAST FURNACES.

HOUSE, Handbook of House Property; by E. L. Tarbuck. 12mo. *London* 1875.

HOUSE Drainage, Sewerage, and Ventilation; by R. E. Middleton. *See* SEWAGE.

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HYDRAULICS, as under :—

Hydraulics, Specifications. *See* PATENTS.

Hydraulic Arrangements at Noisiel; by H. Menier. 8vo. (French.)

Lowell Hydraulic Experiments; by J. B. Francis. Folio. *Boston* 1855.

Nautical and Hydraulic Experiments; by Col. M. Beaufoy. 4to. *London* 1834.

Hydraulics; by — Belanger. (French.) Folio. *Paris* 1849–1850.

Hydro-mechanics; by M. Rühlmann. (German.) 8vo. *Leipzig* 1857.

— — (2nd edition). *Hanover* 1879.

Practical Hydraulics; by S. Downing. 2nd edit. 8vo. *London* 1861.

— — 3rd edit., part I. 8vo. *London* 1875.

Hydraulic Tables, Coefficients, and Formulæ; by J. Neville. *London* 1875.

Hydraulics (Cours de Mécanique appliquée, Pt. 2); by — Bresse. *Paris* 1879.

Flow of Water in Open Channels; by R. Gordon. Folio. *Rangoon* 1875.

— — — — discussion of a new Formula; by R. Gordon. Folio. *Milan* 1875.

Hydraulics; by H. W. 8vo. *School of Military Engineering, Chatham* 1878.

Hydraulics of Great Rivers; by J. J. Révy. 4to. *London* 1874.

Friction of Water. *See* FRICTION.

Frictional Resistance of Water on a Surface. *See* FRICTION.

Indian Irrigation Works and practical Engineering Construction; by Lieut.-Gen. Sir A. Cotton. Folio. *Chatham* 1875.

Indian Irrigation Works; by Col. F. H. Rundell. Folio. *Chatham* 1875.

Manual of Hydrology; by N. Beardmore. *London* 1862.

Motion of Fluids in Pipes; by W. Pole. 8vo. *London* 1852.

HYDRAULICS, *as under (continued):—*

- Direct-Acting Hydraulic Machinery; by R. H. Tweddell. 8vo. *London* 1877.
- Hydraulic and other Machines for Raising Water; by T. Ewbank. 8vo. *New York* 1847.
- Hydraulic Machinery for Mines; by J. Ritter von Hauer (German). 8vo. *Leipzig* 1879.
- Hydraulic Machinery for small motive power; by W. Anderson. 8vo. *Dublin* 1871.
- Hydraulic Wheels; by A. Achard. (French.) 8vo.
- Water Commanding Engine; by Marquis of Worcester. *See* PATENTS.
- Water Scoop Wheels; by W. Wheeler. *See* PATENTS.
- Hydraulic Railway; by G. Shuttleworth. *See* RAILWAYS.
- Handbook for Calculation and Construction of Turbines and Turbine Pumps; by C. A. Ångström. (Swedish.) 8vo. *Stockholm* 1880.
- Turbine-Fourneyron; by Dobronraroff. *St. Petersburg* 1850.
- Williamson's Vortex Water Wheel. 8vo. *Kendal* 1862.
- New Self-acting Weir; by J. M. Pearson. *Cambridge* 1878.
- Water Supply and Sewage. *See* SEWAGE.
- Water Supply, Rainfall, &c.; by A. R. Binnie. Folio. *Chatham*.
- Construction and Maintenance of Water Works. Folio. *Chatham* 1871.
- Water Works, Bolehall, Glascote, &c.; by H. J. Marten. Folio. 1878.
- — — Canterbury, Engineer's Report, &c. 8vo. *London* 1869.
- — — Dewsbury, Report; by T. Wicksteed. 8vo. *Dewsbury* 1856.
- — — Leeds, Report; by E. Filliter. 8vo. *Leeds* 1866.
- — — London; by an Engineer. 8vo. *London* 1878.
- — — London; by W. Pole. 8vo. *London* 1851.
- — — London, Review of Report of General Board of Health; by S. C. Homersham. 8vo. *London* 1850.
- — — London, Report to Watford Spring Water Co.
- — — London and Westminster, Report; by R. Stephenson. 8vo. *London* 1841.
- — — Naples; by L. Cangiano and C. Laurent. (French.) 8vo. *Neuilly* 1860.
- — — Nijni Novgorod; by L. Poillon. 8vo. *Paris* 1866.
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- — — Sheffield, analysis of evidence on failure of Bradfield Reservoir; by W. Naylor. 8vo. *London* 1864.
- — — Southwark and Vauxhall; by T. W. Rumble. Folio. *London* 1876.
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- — — Wolverhampton; by H. J. Marten. Folio. 1876.

HYDROLOGY, Manual of; by N. Beardmore. *See* **HYDRAULICS**.

HYDRO-MECHANIK; by M. Rühlmann. *Hanover* 1879. *See* **HYDRAULICS**.

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I.

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INCREASE of population in England and Wales; by R. Price Williams. 8vo. *London* 1880.

INDEX to the Railway System; by W. Fleming. *See* **RAILWAYS**.

INDEX of Patents. *See* **PATENTS**.

INDIA, *as under* :—

Classified List of Establishment of Indian Public Works Department. 8vo. *Calcutta* 1880.

Royal Indian Engineering College, Calendar. 8vo. 1879.

Professional Papers on Indian Engineering. 8vo. *See* **TRANSACTIONS**.

Indian Irrigation Works, and Practical Engineering. *See* **HYDRAULICS**.

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Indian River Navigation. *See* **NAVIGATION**.

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INDICATOR. *See* **STEAM**.

INDICATORS of Speed. *See* **INSTRUMENTS**.

INDUSTRIAL Congress, Paris Exhibition. *See* **EXHIBITIONS**.

INGLIS, Col., Iron Fortifications. *See* **IRON**.

INJECTEUR automoteur de M. H. Giffard; by M. Reech. *See* **LOCOMOTIVES**.

INJECTEUR automoteur; by H. Giffard. *See* **LOCOMOTIVES**.

INJECTORS &c.; by R. Krugg (Russian). 4to. *St. Petersburg*.

INSTITUTIONS. *See* **TRANSACTIONS**.

INSTRUMENTS, *as under* :—

Amsler's Planimeter; by F. J. Bramwell. 8vo. *London* 1872.

Baume's Planimeter; by P. Delahaye. 8vo. *Paris* 1875.

Aneroid Barometer; by E. J. Dent. 8vo. *London* 1849.

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Ships' Compasses; by J. R. Napier. 8vo.

INSTRUMENTS, *as under (continued):—*

- Cyclograph for setting out Railway Curves; by R. Price Williams. 4to
London 1849.
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London 1875.
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London 1857. *See* STEAM.
- Martin's Steam-Engine Indicator; by P. Garnier. *See* STEAM.
- Dynamometer for Locomotives (Russian). 4to.
- New Dynamometric Indicator; by P. Garnier. 4to. *Paris*.
- Mathematical Instruments; by J. T. Heather. 8vo. *London* 1856.
- Philosophical Instruments in 1851 Exhibition. *See* EXHIBITIONS.
- Resistance Thermometer; by C. W. Siemens. 8vo. *London* 1861.
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- Application of Iron to Machinery; by W. Fairbairn. 8vo. *Newcastle* 1864.
- Ironclads; by E. J. Reed. *See* SHIPS.
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- Papers on Iron and Steel; by D. Mushet. *London* 1840.
- Heaton's process for treatment of Cast Iron, and manufacture of Steel. *London* 1869.
- Cast-Iron and Nickel, properties of mixture; by W. Fairbairn. *Manchester* 1858.
- Strength of Cast-Iron; by E. Hodgkinson. 8vo. *London* 1846.

IRON, *as under (continued):—*

Strength of Cast-Iron and other Metals ; by T. Tredgold and E. Hodgkinson
8vo. *London* 1842.

Ditto (2nd edition, imperfect).

Application of Cast and Wrought Iron to Building purposes ; by W. Fairbairn.
8vo. *London* 1857–1858. *See* BUILDING.

Early Use of Iron ; by St. J. V. Day. 8vo. *Edinburgh* 1873.

Effect of Impact upon Wrought-Iron Girders ; by W. Fairbairn. 4to. *See*
BRIDGES.

Iron Fortifications ; by Col. Inglis. Folio. *London* 1875.

History and Manufacture of Iron ; by W. Fairbairn. 8vo. *Edinburgh* 1861.

Manufacture of Iron ; by F. Overman. 8vo. *Philadelphia* 1850.

Iron-Making Resources of the United Kingdom, Exhibition of 1851 ; by S. H.
Blackwell. 12mo. *London* 1852.

Iron Manufacture of Great Britain ; by W. Truran. 4to. *London* 1855.

Iron Manufacture and Bessemer invention. 8vo. *Birmingham* 1856.

Manufacture of Cast and Wrought Iron ; by E. Flachet, A. Barrault, and
J. Petiet (French). 4to. Folio Plates. *Liège* 1852.

Smelting Iron and Steel ; by C. W. Siemens. 8vo. *London* 1873.

Rise and progress of Cleveland Iron Trade ; by J. Gjers. 8vo. *London* 1875.

Foreign Competitors in the Iron Trade ; by I. Lowthian Bell. 8vo. *Newcastle*
1868.

Iron Trade of Carinthia ; by J. de Rosthorn. 4to. *Vienna* 1865.

Swedish Iron Marks ; by H. E. Ahrenberg. 8vo. *Göteborg* 1864.

Iron as a Material of Construction ; by W. Pole. 12mo. *London and New York*
1872.

Strength of Cast-Iron Pillars ; by J. B. Francis. *See* MECHANICS.

Puddling Iron ; by C. W. Siemens. 8vo. *London* 1871.

Puddling Iron by Machinery, various plans ; by W. Yates. 8vo. *London* 1868.

Puddling Furnace at Newport ; by J. Head. *Newcastle* 1872.

The Iron Question ; by Joseph Hall. 8vo. *London* 1857.

Experiments on the strength of Iron Rails ; by C. P. Sandberg. 8vo. *London*
1869.

Construction of Iron Ships. *See* SHIPS.

Improved forms of Iron for Shipbuilding ; by J. Kennedy and T. Vernon. 8vo.
Liverpool 1856.

Iron Smelting with small coal ; by G. Fowler. 8vo. *London* 1870.

Iron and Steel, for Constructive purposes ; by D. Adamson.

Experiments on Iron and Steel ; by D. Kirkaldy. 8vo. *Glasgow* 1862.

Wrought Iron and Steel ; by K. Styffe, translated by C. P. Sandberg. 8vo.
London 1869.

Change of form in Heating and Cooling Wrought Iron ; by Lieut.-Col. Clerk.
8vo. *London* 1863.

IRON, *as under (continued):—*

Sections of Rolled Iron Joists, Girders, and Fire-proof Floors; by Messrs. Measures Bros. and Co. *London*.

Catalogue of Galvanised Corrugated Iron for Roofs, Sheds, and Fencing; by Messrs. J. A. Young and Co. 4to. *Manchester* 1880.

Catalogue of Iron, Wire, Wire Rope, and Fencing; by Messrs. Rowell. Folio. *London* 1881.

Weights of Angle and Tee Iron, Tables for Engineers; by — Stannah. Folio. *London* 1867. *See* TABLES.

Fossick's Fifty Years' History of the Iron Trade; by R. R. Mabson. Chart, folio. *London* 1881.

IRRAWADDY, Report on the Irrawaddy River; by R. Gordon. *See* RIVERS.

IRRIGATION Works. *See* HYDRAULICS.

ISHERWOOD, B. F., Engineering Precedents for Steam Machinery. *See* STEAM SHIPS.

— Experimental Researches in Steam Engineering. *See* STEAM SHIPS.

ITALIAN Dictionary, Baretto's. *See* DICTIONARIES.

J.

JACQMIN, F., Acquisition of Railways by the State. *See* RAILWAYS.

JANICKI'S Floating Dock. *See* DOCKS.

JAPAN, Imperial Mint, First Report of Commissioners; by T. Ishimal. 8vo. *Hiogo* 1875.

JEANS, J. S., History, Manufacture, and Uses of Steel. *See* STEEL.

— Notes on Northern Industries. *See* NORTHERN.

— Stockton and Darlington Railway. *See* RAILWAYS.

JEFFCOCK, Memoir of Parkin Jeffcock; by Rev. J. T. Jeffcock. 8vo. *London* 1867.

JENKIN, F., Bridges. *See* BRIDGES.

— Education of Engineers. *See* EDUCATION.

— Electrical Standards. *See* ELECTRICITY.

— Electricity and Magnetism. *See* ELECTRICITY.

JOHNSON, W., Cyclopedia of Machinery. *See* MACHINERY

— Laws connected with Letters Patent. *See* PATENTS.

— Patent Law Amendment Act. *See* PATENTS.

JOHNSTON, A. K., Handy-Royal Atlas. *See* ATLAS.

—, Physical Atlas. *See* ATLAS.

JOHNSTONE, J., Sugar Manufacture. *See* SUGAR.

JOINT Chair for Bridge Rails; by W. Anderson. *See* RAILWAYS.

JORDAN, M. S., Manufacture of Cast Steel. *See* STEEL.

— Manufacture of Guns. *See* GUNS.

— Projectiles for Artillery. *See* GUNS.

JOURNALS, *as under* :—

Annales Industrielles (from 1878). 4to. and plates. *Paris*.

Artisan (from vol. vii., 1849, to 1871). *London* 1849–1871.

Civil Engineer and Architect's Journal (from vol. xiii., 1850, to 1867, excepting 1851). *London* 1852–1867.

Colliery Guardian (from 1878). Folio. *London*.

Der Civil-Ingenieur (from 1877). 4to. *Leipzig*.

The Engineer (from commencement 1856). *London*.

Engineering (from commencement 1866). *London*.

Engineering and Mining Journal (from 1878). 4to. *New York*.

Iron (from commencement 1873). *London*.

Iron and Coal Trades Review (from 1878). Folio. *London*.

London Journal and Repertory of Arts and Sciences (from vol. 37, 1850, to 1866). *London* 1850–1866.

Mechanics' Magazine (from vol. 51, 1849, excepting vols. 54, 55, 56, 60). *London* 1849–1871.

Mining Journal (from 1881). *London*.

Mining Magazine and Review. 1872.

Il Politecnico (from 1878). 4to. *Milan*.

Philosophical Magazine and Journal of Science. 1831–1836. 8vo. *London*.

Practical Mechanic's Journal (from vol. 3, 1850, excepting 1853). *Glasgow* and *London* 1850–1870.

Railroad Gazette (from 1878). Folio. *New York*.

Railway Engineer (from 1880). Folio. *London*.

Railway Record (from 1881). *London*.

Revue Générale des Chemins de Fer (from 1878). Folio. *Paris*.

Revue industrielle (French, from 1874). 4to. *Paris*.

Van Nostrand's Engineering Magazine (from vol. 22, 1880). *New York*.

Scientific American (from 1880). Folio. *New York*.

Ryland's Iron Trade Circular (from 1880). *Birmingham*.

Telegraphic Journal (from 1879). 4to. *London*.

The Times, Index, from 1880. 8vo. *London*.

JUBILEE Memorial, Stockton and Darlington Railway. *See* RAILWAYS.

K.

- KARMARSCH, K., Mechanical Technology (German). 2 vols., 8vo. *Hanover* 1876.
- KENNEDY, A. B. W., Geometric Solutions of Mechanical Problems. *See* MECHANICS.
- KENNEDY, J., Improved Forms of Iron for Shipbuilding. *See* IRON.
- KENNEDY, J. P., Indian Railways. *See* RAILWAYS.
- KERL, B., Repertory of Technical Literature. *See* ENGINEERING.
- KERR, J., Prospects of Metric System. *See* MEASURES.
- KEW Committee, Reports. *See* METEOROLOGY.
- KILNS for Drying Malt; by Page and Halse. *See* PATENTS.
- KINEMATICS, Theoretical; by F. Reuleaux. *See* MECHANICS.
- KING, J. W., War-Ships and Navies of the World. *See* STEAM SHIPS.
- KIRKALDY, D., Experiments on Wrought-Iron and Steel. *See* IRON.
- Fagersta Steel. *See* STEEL.
- Machinery of "Arabia" and "La Plata." *See* STEAM SHIPS.
- KITCHEN and Hot-Water Boiler Explosions; by S. B. Goslin. *See* BOILERS.
- KNIGHT, C., Mechanician and Constructor. *See* MACHINERY.
- KNIGHT, H., Multiplication Tablets. *See* TABLES.
- KRUPP Steel. *See* STEEL.

L.

- LABOULAYE, C., Dictionnaire des Arts et Sciences. *See* DICTIONARIES.
- LACROIX, E., General Description of Paris Exhibition, 1867. *See* EXHIBITIONS.
- LAISSLE, F., Construction of Bridge Girders. *See* BRIDGES.
- LAKE of Constance, Lowering of Flood Level. *See* RIVERS.
- LAMPS &c., Specifications. *See* PATENTS.
- LANCASHIRE and Cheshire Coal Trials. *See* COAL.
- LAND Question; by T. Aveling. *See* AGRICULTURE.
- LANGEN, E., Taking off Blast-Furnace Waste Gas. *See* BLAST FURNACES.
- LANZ, —, Construction of Machinery. *See* MACHINERY.
- LARDNER, D., Railway Economy. *See* RAILWAYS.
- LASLETT, T., Properties and Characteristics of Timber. *See* TIMBER.
- LATHAM, B., Sanitary Engineering. *See* SEWAGE.
- LATHAM, J. H., Wrought-Iron Bridges. *See* BRIDGES.
- LATHAM, R. G., Dictionary of the English Language. *See* DICTIONARIES.
- LAUNCHES, Steam. *See* STEAM SHIPS.
- LAURENT, A., Chemical Method of Notation. *See* CHEMISTRY.
- LAURENT, C., Artesian Wells in Oriental Sahara. *See* BORING.

- LAURENT, C., Borings executed in Oriental Sahara. *See* BORING.
- Naples Water Supply. *See* HYDRAULICS.
- LAURENT-DEGOUSSÉE, C., Exploratory Boring. *See* BORING.
- LAVALLEY, A., Suez Canal. *See* CANALS.
- LAVOINNE AND PONTZEN, Chemins de fer en Amérique. *See* RAILWAYS.
- LAW, Administrative; by — Cotellet (French). Folio. *Paris* 1847-1848.
- LAW, H., and G. R. Burnell, Civil Engineering. *See* ENGINEERING.
- LAW, H., Construction of Roads and Streets. *See* ROADS.
- LAWS of Patents. *See* PATENTS.
- LEA, W., Strength and Deflection of Timber. *See* TABLES.
- LEAHY, E., Road Making and Repairing. *See* ROADS.
- LEAN, T., Cornish Engine Reporter. *See* STEAM ENGINE.
- LEATHER Making; by J. P. Damourette. 8vo. *Paris* 1869.
- LE CHATELIER, L., Locomotive Engine Builder and Driver. *See* LOCOMOTIVES.
- Counter-Pressure Brake. *See* BRAKES.
- LECOUNT, P., Practical Treatise on Railways. *See* RAILWAYS.
- LEEDS Water Supply. *See* HYDRAULICS.
- LEGÉ, A., Preservation of Timber. (French.) *See* TIMBER.
- LEGRAND, A., Wrought-Iron Sleepers. *See* RAILWAYS.
- LEHMANN, —, Physiological Chemistry. *See* CHEMISTRY.
- LEIDY, J., Fossil Vertebrates. *See* UNITED STATES.
- LEPIDOPTERA of North America. *See* UNITED STATES.
- LESLIE, B., Gorai Bridge. *See* BRIDGES.
- LESLIE, J., Elements of Geometry. *See* GEOMETRY.
- LESSAR, P., Construction of Railways in time of War. *See* RAILWAYS.
- LEVEL, E., Railways before Parliament. *See* RAILWAYS.
- LEVELLING and Surveying Instruments. *See* INSTRUMENTS.
- LEVI, L., Metric System of Weights and Measures. *See* MEASURES.
- LEYDEN Jar, Residual Charge; by J. Hopkinson. *See* ELECTRICITY.
- LIBRARY, Free Library of Liverpool, Report 1879-80.
- LIBRARY, Manchester Reference Library, Catalogue 1864.
- LIBRARY, Manchester Free Libraries, Report 1879.
- LIGHT, Lectures on Light; by J. Tyndall. *See* PHYSICS.
- LIGHT, Notes of Lectures on Light; by J. Tyndall. *See* PHYSICS.
- LIGHT Railways; by C. D. Fox. *See* RAILWAYS.
- LIGHT Railways in Sweden; by C. P. Sandberg. *See* RAILWAYS.
- LIGHTHOUSES**, as under :—
- Lighthouse Apparatus and Lanterns; by D. M. Henderson. 8vo. *London* 1868.
- List of Chinese Lighthouses, Buoys, and Beacons; by Inspector-General of Customs. 4to. *Shanghai* 1874-1881.
- Lighthouse Dioptric Apparatus; by Chance and Co. 4to. *Birmingham* 1875.

LIGHTHOUSES, as under (*continued*):—

Lighthouse Illumination and Apparatus; by Chance and Co. 4to. *Birmingham* 1861.

Report on Sea Lighting of Entrance to the Yang-Tsze River, China; by D. M. Henderson. 4to. *China* 1869.

LIGHTING, Electric. *See* **ELECTRICITY**.

LIGHTNING Conductors; by R. Anderson. 4to. *London* 1879.

LIMES. *See* **CEMENTS**.

LINDSAY, Lord, Index of Struve's Double Stars. *See* **ASTRONOMY**.

— Mauritius Expedition for observing Transit of Venus. *See* **ASTRONOMY**.

LINK Motion, Evidence given in the case. *See* **LOCOMOTIVES**.

LITTLE, —, Electric Telegraph. *See* **TELEGRAPHS**.

LIVERPOOL and Manchester Railways; by T. Ashbury. *See* **RAILWAYS**.

LIVERPOOL Free Library. *See* **LIBRARY**.

LIVERPOOL Polytechnic Society. *See* **TRANSACTIONS**.

LIVERY Companies' Report on Technical Education. *See* **EDUCATION**.

LOCKS, Bolts, &c., Specifications. *See* **PATENTS**.

LOCOMOTIVES, as under:—

Balancing of Locomotive Driving Wheels; by C. Couche. (French.) 8vo. *Paris* 1853.

Atlas of Locomotives (Russian). Folio.

Evidence in the case of the Link Motion. 2 vols., folio. *London* 1851.

Fireless Locomotive; by L. Francq (French). 8vo. *Paris* 1878.

— — Comparative Study (French). 8vo. *Paris*.

— — by E. Lamm and L. Francq. 4to. *Paris* 1877.

Giffard's Injector for Feeding Steam Boilers; by M. Reech. (French.) 4to. *Paris* 1860.

Injector for Feeding Steam Boilers and Raising Water; by H. Giffard (French). 4to. *Paris* 1861.

Locomotive Adhesion. 8vo. *London* 1865.

Strength and Explosions of Locomotive Boilers; by W. Fairbairn. *See* **BOILERS**.

Catechism of the Locomotive; by M. N. Forney. 8vo. *New York* 1876.

Locomotive Engineering and Mechanism of Railways; by Z. Colburn. 2 vols., folio. *London* 1871.

Locomotive Engine Builder's and Driver's Guide; by L. Le Chatelier, E. Flachet, J. Petiet, and C. Polonceau (French). 8vo. *Paris* 1859.

Relative powers of Locomotive Engines; by W. Fairbairn. 8vo. *Manchester* 1851.

Use of Heated Air and Steam in Locomotives; by R. Eaton. 8vo. *London* 1873.

Locomotives at the Vienna Exhibition; by — Deghilage and J. Morandière. Folio. *Paris*.

LOCOMOTIVES, *as under (continued)* :—

- The Locomotive of 1879 ; by T. Daniels. 8vo. *Manchester* 1880.
- Results of working of the Compound Locomotive ; by A. Mallet (French). 4to. *Paris* 1880.
- Machines for Drilling and Tapping Holes for Firebox Screw-Stays ; by F. Mathias (French). 4to. *Paris*.
- Practical treatise on Locomotive Engines upon Railways ; by F. M. G. de Pambour. 8vo. *London* 1836.
- Report of Committee on Distribution of Weight in Locomotives (German). 4to. *Berlin* 1853.
- Utilisation of Steam in Locomotives ; by A. Mallet (French). 8vo. *Paris* 1878.
- The Locomotive, what it is and what it ought to be ; by R. F. Fairlie. 8vo. *London* 1864.
- LODES of Cornwall ; by J. H. Collins. *See MINES*.
- LOEWE, F., Report on Riveted Joints. *See RIVETED JOINTS*.
- LOGARITHMS. *See TABLES*.
- LONDON Drainage. *See DRAINAGE*.
- LONDON Exhibitions, 1851 and 1862. *See EXHIBITIONS*.
- LONDON Journal. *See JOURNALS*.
- LONDON and North Western Railway, Report of Consultation 1856. *See RAILWAYS*.
- LONDON Sewage Co. *See SEWAGE*.
- LONDON Water Works. *See HYDRAULICS*.
- LONDONDERRY, Geological Report. *See IRELAND*.
- LONG Span Railway Bridges ; by B. Baker. *See BRIDGES*.
- LONGRIDGE, J. A., Cheap Railways for the Colonies. *See RAILWAYS*.
- Steam Coals of the Hartley district. *See MINES*.
- LONGRIDGE, M., Trial of Engine and Boilers at Messrs. Nuttall's. *See STEAM ENGINE*.
- LOSS by Friction in the Steam Engine ; by W. Pole. *See STEAM ENGINE*.
- LOVE, G. H., Résistances &c. de la Fonte, du Fer, et de l'Acier. *See MECHANICS*.
- LOWELL Hydraulic Experiments. *See HYDRAULICS*.
- LUBRICATION. *See FRICTION*.
- LUCAS, M. F., Roads, Railways, Canals, and Ports of France. *See ROADS*.
- LUND, H., Patent Inventions. *See PATENTS*.
- LYELL, Sir C., Elements of Geology. *See GEOLOGY*.
- , Principles of Geology. *See GEOLOGY*.

M.

MABSON, R. R., Fossick's Fifty Years' Chart of the Iron Trade. *See* IRON.

MACHINERY, *as under* :—

General Treatise on Machinery; by M. Rühlmann (German). *Brunswick* 1875.

Elements of Machine Design; by W. C. Unwin. Svo. *London* 1878.

Efficiency and Performance of Machine Tools; by E. Hartig (German). 4to.

Leipzig 1873 (and another edition 1869).

Engineer and Machinist's Assistant. *See* ENGINEERING.

Construction of Machinery; by Lanz and Bétancourt. 4to. Atlas. *Paris* 1840.

Cyclopædia of Machinery; by W. Johnson. Folio. *Glasgow* and *London* 1852.

Machinery in Exhibition of 1851. *See* EXHIBITIONS.

Handbook of Machinery; by C. J. Appleby. 3 vols. *London* 1878.

Mechanician and Constructor; by C. Knight. 4to. *London* 1869.

Mills and Millwork; by W. Fairbairn. 2 vols., Svo. *London* 1863.

Millwork and Machinery; by R. Buchanan, revised by G. B. Rennie. 4to. and folio plates. *London* 1841.

Philosophy of Manufactures; by A. Ure. Svo. *London* 1835.

British Manufacturing Industries; by G. P. Bevan. 14 vols., Svo. *London* 1876.

Cyclopædia of useful Arts; by C. Tomlinson. 3 vols. *London* 1866.

Machinery and Millwork; by R. Buchanan. Svo. *London* 1841.

Machinery at the Vienna Exhibition; by H. Fontaine. *See* EXHIBITIONS.

Machines and Tools in Exhibition of 1851; by R. Willis. *See* EXHIBITIONS.

Machinery of Nineteenth Century; by G. D. Dempsey. 4to. and folio plates. *London* 1852.

Machines for Shearing, Punching, Riveting, and Forging; by T. S. Sawyer. Svo. *London* 1858.

Theatrum Machinarum Novum; by G. A. Bückler (German). Folio. *Nürnberg* 1673.

Farcot Servo-Motor and Regulator; by É. Barrault (French). Svo. *Paris* 1876.

Clock Machinery at the Liége Exhibition 1880; by — Gérard. Svo.

Machines and Weapons of War; by W. Drummond. *See* PATENTS.

Machine for carrying Ships against Wind and Tide; by J. Hulls. *See* PATENTS.

Machinery of "Arabia" and "La Plata"; by D. Kirkaldy. *See* STEAM SHIPS.

Workshop Appliances; by C. P. B. Shelley. Svo. *London* 1879.

Belt Gearing; by E. J. C. Welch. 12mo. *London* 1875.

Use of Belting; by J. H. Cooper. Svo. *Philadelphia* 1878.

Calculation of the Diameters of Cone Pulleys; by F. Mathias (French). Svo. *Lille*.

Construction of Fitting Tools; by G. Marié (French). Svo. *Paris* 1878.

MACHINERY, as under (*continued*):—

- Greindl Rotary Pump; by L. Poillon (French). 5 Pamphlets. *Paris*.
 History of the Steam Hammer; by J. Rowlandson. 8vo. *Eccles* 1864.
 Paper Making Trade; by Gabriel Planche. 8vo. *Paris* 1853.
 Machinery and Apparatus for a Gunpowder Factory; by J. A. C. Hay. 8vo. *Birmingham* 1877.
 Turner's Manual, Bergeron's (French). 2 vols., 4to. *Paris* 1792.
 Turning and Mechanical Manipulation; by C. Holtzapffel. Vols. 1-3, 8vo. *London* 1846-1856.
 Movable Toolholders; by E. P. Baviile (French). 8vo. *Brussels* 1873.
 Machines for Drilling and Tapping Holes for Firebox Screw-Stays; by F. Mathias. *See* LOCOMOTIVES.
 Shafts of Mills; by R. Buchanan. 8vo. *London* 1814.
 Wood and Stone Working Machinery; by M. R. Western and Co. 4to. *London* 1880.
 Wood-working Machines; by J. Richards. *London* 1872.
 Wood-working Machinery; by M. P. Bale. 8vo. *London* 1880.
 Catalogue of Wood-Working Machinery; by S. Worssam and Co. 8vo. *London* 1878.
 Planing Metals; by H. Tresca (French). 4to. *Paris* 1873.
 Power required in Flax Spinning; by E. Cornut (French). 8vo. *Lille* 1873.
 Protection of Life from Casualties in the use of Machinery; by W. Watson. 8vo. *Boston* 1879.
 Prevention of Shock in Reversing Rolling Mills; by J. Head. 8vo. *Newcastle* 1873.
 Spinning Machinery for Flax and Hemp; by E. Körting (German). 4to. *Leipzig* 1869.
 Tobacco Manufacture; by G. C. (French). Folio. *Paris* 1878.
 Working of Punkahs in India; by Hon. R. C. Parsons. 8vo. *London* 1878.
 Catalogue of Machinery and Tools; by Messrs. Tangye Brothers. 4to. *Birmingham* 1881.
 Machines suitable for Norwegian Industries; by F. Störmer. *See* NORWAY.
 Instructions for the Working of Machinery; by the War Office. 8vo. *London* 1879.

MADAMET, A., Indicators of Speed. *See* INSTRUMENTS.

MAGNETISM and Electricity. *See* ELECTRICITY.

MAIN, T. J., Steam Indicator and Dynamometer. *See* STEAM.

MALAHIDE Viaduct; by W. Anderson. *See* BRIDGES.

MALBERG, A., Railway Fish-Joints. *See* RAILWAYS.

MALEZIEUX, M., Report on Public Works in United States. *See* UNITED STATES.

MALLET, A., Utilisation of Steam in Locomotives (French). *See* LOCOMOTIVES.

MALLET, A., Results of Working of the Compound Locomotive (French).

See LOCOMOTIVES.

MALLET'S Buckled Plates. *See* RAILWAYS.

MALTAGE Pneumatique; by N. Galland. 8vo. *Nancy* 1874.

MANAGEMENT of Steel; by G. Ede. *See* STEEL.

MANCHESTER Association of Employers, Foremen, &c., Report 1879.

MANCHESTER Boiler Insurance Company. *See* BOILERS.

MANCHESTER Literary and Philosophical Society. *See* TRANSACTIONS.

MANCHESTER Geological Society. *See* TRANSACTIONS.

MANCHESTER Reference Library, Catalogue.

MANCHESTER Steam Users' Association. *See* BOILERS.

MANCHESTER Scientific and Mechanical Society. *See* TRANSACTIONS.

MANSEL, R., Steam Ship Efficiency. *See* STEAM SHIPS.

MANUFACTURE and Distillation of Coal Gas; by S. Clegg. *See* GAS.

MANUFACTURE and Distribution of Coal Gas; by W. Richards. *See* GAS.

MANUFACTURE of Iron; by F. Overman. *See* IRON.

MANUFACTURE and Wear of Rails; by C. P. Sandberg. *See* RAILWAYS.

MARIÉ, G., Construction of Fitting Tools. *See* MACHINERY.

— Construction of Implements. *See* AGRICULTURE.

— Steam Engine Governors. *See* STEAM ENGINE.

MARINE Boilers of the United States. *See* BOILERS.

MARINE Boilers; by C. Wye Williams. *See* BOILERS.

MARINE Engine Construction and Classification. *See* STEAM ENGINE.

MARINE Engineering; by J. B. Redman. Folio. *Chatham* 1875-6.

MARINE Propulsion; by W. R. Eckart. *See* STEAM SHIPS.

MARINE Propulsion, Specifications. *See* PATENTS.

MARKS of Swedish Iron. *See* IRON.

MARSEILLES Scientific and Industrial Society. *See* TRANSACTIONS.

MARSH, J. F., Wooden and Fire-proof Floors. *See* BUILDING.

MARTEN, E. B., Boiler Explosions. *See* BOILERS.

— Economy of Coal. *See* COAL.

MARTEN, H. J., Drainage of Dudley. *See* DRAINAGE.

— Wolverhampton Water Works. *See* HYDRAULICS.

— Stafford Water Works. *See* HYDRAULICS.

— Water Supply of Bolehall, Glascote, &c. *See* HYDRAULICS.

MARTIN'S Steam-Engine Indicator; by P. Garnier. *See* STEAM.

MARTINDALE, Lieut.-Col. B. H., Engineering and Engineers. *See* ENGINEERING.

— Internal Communications in New South Wales. *See* AUSTRALIA.

— Recollections of Canada. *See* CANADA.

MARTINI-HENRY Rifle. *See* FIRE-ARMS.

MARY, —, Inland Navigation. *See* CANALS.

MASON, J., Year-Book of Facts in Science and the Arts. *See* PHYSICS.

MASONRY and Stone Cutting ; by E. Dobson. *See* CEMENTS.

MATERIALS, Building. *See* BUILDING.

MATHEMATICAL Dictionary ; by P. Barlow. *See* DICTIONARIES.

MATHEMATICAL Instruments ; by J. T. Heather. *See* INSTRUMENTS.

MATHESON, E., Aid Book to Engineering Enterprise Abroad. *See* ENGINEERING.

— Works in Iron : Bridge and Roof Structures. *See* BRIDGES.

MATHIAS, F., Diameter of Cone Pulleys. *See* MACHINERY.

— Machines for Drilling and Tapping Holes for Firebox Screw-Stays. *See* LOCOMOTIVES.

— Re-railing Apparatus for Derailments. *See* RAILWAYS.

MAUDSLAY, J., Stern Propeller for Steam Vessels. *See* STEAM SHIPS.

MAURITIUS, Inundation Committee, Papers. Folio. *Mauritius* 1865.

MAURITIUS Expedition for the Transit of Venus. *See* ASTRONOMY.

MAXWELL, J. C., Theory of Heat. *See* HEAT.

MAYNARD, W. N., Crumlin Viaduct. *See* BRIDGES.

MCDUGALL, N., Simple and Compound Steam Engine. *See* STEAM ENGINE.

McKEAN'S Rock Boring Machinery. *See* BORING.

MEASURES, Messrs., Sections of Rolled Iron Joists, Girders, and Fire-proof Floors. *See* IRON.

MEASURES, as under :—

Improvement of Arithmetic ; by Yates and Barrett. 8vo. *London* 1860.

Decimal Measure Association, Proceedings. 8vo. *London* 1854.

Decimal System of Measurement for Mechanical Engineering Work ; by J. Fernie. 8vo. *Birmingham* 1859.

— — — in Boring and Turning Wheels, &c. ; by J. Fernie. 8vo. *Birmingham* 1860.

Decimal Weights and Measures, British ; by Abacus. 8vo. *Edinburgh* 1872.

— — — Description ; by J. Yates. 8vo. *Edinburgh* 1864.

— — — New System ; by M. Dalhanty. 8vo. *Lisbon* 1861.

— — — Report of Select Committee, and Bill ; Parliamentary Paper. Folio. *London* 1862.

British and Metric Weights, Scales for ready comparison ; by A. L. Newdigate. In case. *London*.

Relative Advantage of Inch and Metre as Unit of Decimal Measure ; by J. Fernie. 8vo. *Birmingham* 1865.

— — — by Council of International Association. 8vo. *London* 1865.

International Decimal Association, Origin, Formation, and Progress. 8vo. *London* 1856.

— — — Reports of Council. 8vo. *London* 1862.

Decimal Measurement in Iron Shipbuilding ; by H. H. West. *See* SHIPS.

Memorial on Decimal Weights. 8vo. *London* 1859.

MEASURES, as under (*continued*):—

- Metric System of Weights and Measures; by J. S. Porter. 8vo. *London* 1859.
 ——— by L. Levi. 8vo. *London* 1863.
 ——— Debate in House of Commons. 8vo. *London* 1863.
 ——— Debates in Parliament. 8vo. *London* 1864.
 ——— Impediments and way to remove them; by F. P. Fellows. 8vo. *London* 1863.
 ——— Prospects; by L. Kerr. 8vo. *London* 1863.
 Proposed Decimal Scales; by J. Whitworth.
 Standard Decimal Measure of Length, and its application to Mechanical Engineering Work; by J. Whitworth. 8vo. *Birmingham* 1857.
 Whitworth Measuring Machine; by T. M. Goodeve and C. P. B. Shelley. 8vo. *London* 1877.

Yard, Pendulum, and Metre; by Sir John Herschel. 8vo. *London* 1863.

MECHANICAL Gas Stoking; by R. P. Spice. *See GAS.*

MECHANICAL Theory of the Steam Engine; by T. Baker. *See STEAM ENGINE.*

MECHANICAL Theory of Heat; by R. Clausius. *See HEAT.*

MECHANICAL Theory of Heat; by C. M. Guldberg. *See HEAT.*

MECHANICAL Theory of Heat; by G. Zeuner. *See HEAT.*

MECHANICIAN and Constructor; by C. Knight. *See MACHINERY.*

MECHANIC'S Pocket Dictionary; by W. Grier. *See DICTIONARIES.*

MECHANICS, as under:—

Strength of Constructions, and Dynamic Theory; by — Belanger (French). Folio. *Paris* 1848-1849.

Strength of Materials; by P. Barlow. *London* 1867.

Mechanics; by W. J. M. Rankine. 4to. 1857.

Mechanics; by W. Whewell. 8vo. *Cambridge* 1819.

Papers on Mechanical Subjects; by J. Whitworth. 8vo. *London* 1858.

Manual of Applied Mechanics; by W. J. M. Rankine. 12mo. *London* 1858.

Mechanische Technologie; by — Karmarsch. 2 vols., 8vo. *Hanover* 1876.

Der Constructeur; by F. Reuleaux. *Brunswick* 1872.

Principles of Engineering and Architecture; by H. Moseley. *London* 1843.

Principles of Mechanics and Construction; by F. Redtenbacher. *Mannheim* 1859.

Elements of Mechanism; by T. M. Goodeve. 8vo. *London* 1880.

Principles of Mechanism; by R. Willis. 8vo. *London* 1870.

——— 1841.

Aide Mémoire de Mécanique pratique; by A. Morin. *Paris* 1871.

Science of Construction for Engineers (vol. 3, Foundations and New Structures); by W. Frauenholz (German). 4to. *Munich* 1877.

Strength and Elasticity of Materials; by W. J. Millar. 8vo. *London* 1879.

Strength of Cast-Iron; by E. Hodgkinson. *See IRON.*

MECHANICS, *as under (continued):—*

- Strength of Cast-Iron Pillars; by J. B. Francis. 8vo. *New York* 1865.
- Strength of Materials and Structures; by J. Anderson. 8vo. *London* 1872.
- Strength of Materials and Structures; by V. Contamin (French). *Paris* 1878.
- Application of Theory to Practice in Construction; by Col. Wray. 8vo. *Chatham* 1872.
- Elements of Practical Construction; by S. Downing. Part I. 8vo., with folio plates. *London* 1875.
- Practical Engineering Construction; by G. H. Phipps. Folio. *Chatham* 1874.
- Elastic Reaction; by H. Streintz (German). *Vienna* 1879.
- Engineers' Pocket Book; by T. Adcock. *London* 1881.
- Engineers' Pocket Book; by J. C. Trautwine. *Philadelphia* and *London* 1876.
- Strength and Dimensions; by J. J. Weyrauch. *Leipzig* 1876.
- Handbook of Technology; by D. Hartig.
- Applied Mechanics; by V. Dwelshauvers. *Paris* 1866.
- Applied Mechanics; by V. Dwelshauvers-Dery. *Mons* 1876.
- Applied Mechanics; by M. Navier (French). *Paris* 1864.
- Balanced Spring; by M. Immisch. 8vo.
- Power Transmission; by C. D. Goubet (French). 8vo. *Paris* 1878.
- Teledynamic Power Transmission; by C. F. Hirn (French). 8vo. *Mulhouse* 1867.
- Transmission and Distribution of Power to a Distance; by A. Achard (French). 8vo. *Paris* 1876.
- Power without Fuel, from heat of natural sources; by J. S. Baldwin. 8vo. *New York* 1869.
- Relative advantages of Wind, Water, and Steam as motive powers; by S. B. Goslin. 8vo. *London* 1879.
- Resistance of Tubes to Collapse; by T. Belpaire (French). 8vo. *Paris* 1879.
- — — by W. Fairbairn. 4to. *London* 1858.
- Résistances &c. de la Fonte, du Fer, et de l'Acier; by G. H. Love. *Paris* 1873.
- Rules, Tables, &c. See TABLES.
- Strength of Swedish Plates; by the Iron Department of Sweden (French). *Stockholm* 1878.
- Stresses produced by rapid Rotation of an Elastic Disc; by J. Hopkinson. 8vo. 1872.
- Treatise on the Teeth of Wheels; by M. Camus, translated by J. F. Hawkins. 8vo. *London* 1837.
- Theoretical Kinematics; by F. Reuleaux (German). 3 vols. 8vo. *Braunschweig* 1875.
- Theory of Strains in Girders and similar structures; by B. B. Stoney. 8vo. *London* 1873.

MECHANICS, *as under (continued) :—*

Experiments on Draught of Carriages; by A. Morin (French). 4to. *Paris* 1842.

Useful Information for Engineers; by W. Fairbairn. 3 vols. 8vo. *London* 1866.

Essential Elements of Practical Mechanics: by O. Byrne. 8vo. *London* 1872.
Mechanic's Magazine. See JOURNALS.

Geometric Solutions of some statical problems in Mechanism; by A. B. W. Kennedy.

Mécanique chimique; by M. Berthelot. See CHEMISTRY.

MECHI, J. J., Farming on Stiff Clays. See AGRICULTURE.

MEDICINES, &c., Specifications. See PATENTS.

MELBOURNE Exhibition, 1880. See EXHIBITIONS.

MELLISS, J. C., Purification of Water-carried Sewage. See SEWAGE.

MENIER, M., Hydraulic Arrangements at Noisiel. See HYDRAULICS.

MENIER'S Chocolate Works, Handbook. *Paris* 1878.

MERCHANT, —, Railway Carriages. See RAILWAYS.

MERSEY Docks and Harbour; by J. J. Birckel. See DOCKS.

METAL Mining; by J. H. Collins. See MINES.

METALLIFEROUS Deposits of Cornwall. See MINERALOGY.

METALLURGY, *as under :—*

Manual of Metallurgy; by W. H. Greenwood. 2 vols. 12mo. *London and Glasgow* 1875.

Beaufumé's Gas-Flame Furnace. 8vo. *Glasgow* 1857.

History of Electro-Metallurgy; by H. Dircks. 12mo. *London* 1863.

Metallum Martis, Dud Dudley's. See PATENTS.

Metallica; by S. Sturtevant. See PATENTS.

Metallica; by J. Rovinson. See PATENTS.

Mechanical properties derived from repeated Meltings of Metals; by W. Fairbairn. 8vo. *London* 1863.

Mechanical and Physical Properties of Copper-Tin Alloys; by R. H. Thurston. *Washington* 1879.

Testing of Metals and Alloys; by G. Bishop. 8vo. *Bonn* 1870.

Metallurgy; by F. Overman. *New York* 1854.

Metallurgy of Fuel, Lead, Silver, and Gold; by J. Percy. 3 vols. *London* 1880.

Metallurgy of Iron; by S. B. Rogers. *London* 1857.

Strength of Metals used for Guns; by G. Rosset. See GUNS.

METEOROLOGY, *as under :—*

Report of the Kew Committee. 8vo. *London* 1880.

United States Meteorological Observations from 1854 to 1859. Vol. II., part 1. 4to. *Washington* 1864.

METEOROLOGY, *as under (continued):—*

Meteorological Observations during 1872; by H. Gannett, United States Geological Survey. 8vo. *Washington* 1873.

Meteorological Observations and Essays; by John Dalton. 8vo. *Manchester* 1834.

Periodicity of Rainfall; by G. M. Whipple. 8vo. 1880.

Rate at which Barometric changes traverse the British Isles; by G. M. Whipple. 8vo. 1880.

Duration of Sunshine, &c.; by G. M. Whipple. 8vo. *London* 1879.

Height of Barometer, &c.; by G. M. Whipple. 8vo. *London* 1879.

METRICAL Tables; by G. L. Molesworth. *See* TABLES.

METROPOLITAN Drainage. *See* DRAINAGE.

METROPOLITAN Fire Brigade, Report of the Chief Officer. 8vo. *London* 1879.

MIDDLETON, R. E., House Drainage, Sewerage, and Ventilation. *See* SEWAGE.

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First Book of Mineralogy; by J. H. Collins. 12mo. *London* 1873.

Mineralogy of Cornwall and Devon; by J. H. Collins. 8vo. *Truro* and *London* 1871.

Mineralogy and Geology, applied to Building; by — Dufrénoy (French). Folio. *Paris* 1847.

Composition of Cornish Rocks; by J. A. Phillips. 8vo. *London* 1871.

Detrital Tin Ore of Cornwall; by W. J. Henwood. 8vo. *Truro* 1873.

Metalliferous Deposits of Cornwall; by W. J. Henwood. 8vo. *Truro* 1872.

Museum of Geology, Library Catalogue.

Origin of Mineral Veins; by J. A. Phillips. 8vo. *London* 1871.

MINES AND MINING, *as under:—*

Mineral Statistics of the United Kingdom; by R. Hunt. 8vo. *London* 1848–1874.

Miners' Association of Cornwall and Devonshire, Reports. *See* TRANSACTIONS.

Mining Institute of Scotland. *See* TRANSACTIONS.

Accidents in Mines; by A. Bagot. 8vo. *London* 1878.

MINES AND MINING, as under (continued):—

- Mines of Rio Tinto, Spain; by J. L. Thomas. 8vo. *London* 1865.
- Coal and Iron Mines and Iron Works in the United States, Notes of a Visit; by I. Lowthian Bell. 8vo. *Newcastle* 1875.
- Coal Mine Explosions, Single and Double Shift Systems; by J. Nixon. 8vo. *Cardiff* 1867.
- Coal Working by Long Wall; by G. Fowler. 8vo. *Newcastle* 1870.
- Conveyance Underground in Coal Mines; by Nicholas Wood. 8vo. *Newcastle* 1855.
- — Appendix; by Nicholas Wood. 8vo. *Newcastle* 1857.
- Working of Mines; by A. Burat (French). *Paris* 1876.
- Explosions in Coal Mines; by J. K. Blackwell. 8vo. *London* 1853.
- First Book of Mining and Quarrying; by J. H. Collins. 12mo. *London* 1872.
- Gases in Coal Mines; by J. J. Atkinson. 12mo. *Newcastle* 1871.
- Lodes of Cornwall; by Prof. Moissenet, translated by J. H. Collins. *London* 1877.
- Mining, as illustrated at the Paris Exhibition, 1878. Corps des Mines (French). 8vo. *Paris* 1878.
- Mining Tools; by W. Morgan. *London* 1871.
- Principles of Metal Mining; by J. H. Collins. 12mo. *London and Glasgow* 1875.
- Storage and Inspection of Submarine Mining and Telegraphic Apparatus. *See TELEGRAPHY.*
- Mining Machinery Catalogue; by Messrs. Oliver & Co. 4to. *London* 1880.
- Explosives Committee's Report; by J. H. Collins. 8vo. *Truro* 1880.
- Miner's Friend; by T. Savery. *See PATENTS.*
- Reports on Steam Coals of the Hartley district; by Messrs. W. G. Armstrong, J. A. Longridge, and T. Richardson. 8vo. *London* 1858.
- Theory and Practice of Coal Mining; by G. Fowler. 8vo. *London* 1870.
- Tunnel and Railway to the Comstock Lode, Nevada; by A. Sutro. 8vo. *London* 1873.
- Ventilation of Coal Mines; by W. Brunton. 8vo. *London* 1849.
- Principles and Practice of Colliery Ventilation; by A. Bagot. *Birmingham* 1879.
- Scroll Drum; by G. Fowler. *Newcastle* 1872.
- Winding and Overwinding at Collicries; by C. M. Percy. 1st ed. and 3rd ed. 8vo. *Wigan* 1880.
- Mining Journal. *See JOURNALS.*
- Mining Magazine and Review. *See JOURNALS.*
- MINT, Imperial Japanese, Report. *See JAPAN.*
- MINTS, Inspection of European Mints; by J. M. Napier. 8vo. *London* 1870.
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N.

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- NAVIGATION of Indian Rivers; by J. Bourne. 8vo. London 1849.

NAVIGATION, Steam. *See* STEAM SHIPS.

NAYLOR, W., Bradfield Reservoir of Sheffield Water Works. *See* HYDRAULICS.

NEEDLES and Pins, Specifications. *See* PATENTS.

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NEW YORK Exhibition, 1854. *See* EXHIBITIONS.

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Address to Philosophical Institute, Canterbury; by E. Dobson. 8vo.
Christchurch 1866.

Bridle Roads and Passes in Canterbury Province; by E. Dobson. Folio.
Christchurch 1865.

NICKEL, Mixture with Cast Iron; by W. Fairbairn. *See* IRON.

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NORMANDY Steam Users' Association, Report for 1877. *See* BOILERS.

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NORTH OF FRANCE Institute of Engineers. *See* TRANSACTIONS.

NORTH STAFFORDSHIRE Institute of Engineers. *See* TRANSACTIONS.

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NORTHUMBERLAND and Durham Coalfield, Map. *See* COAL.

NORWAY, *as under* :—

Iron Mines of Norway.

Layers of Pyrites in certain Slates of Norway; by A. Helland (Norse). 4to.
Christiania 1873.

Norwegian Polytechnic Society. *See* TRANSACTIONS.

Rise of Land in Scandinavia; by S. A. Sexe. 4to. *Christiania* 1872.

Scientific Society of Christiania. *See* TRANSACTIONS.

Machines suitable for Norwegian Industries; by F. Störmer. 8vo. *Christiania* 1880.

NOUVELLE Application industrielle du Piston; by P. Giffard. *See* STEAM
ENGINE.

NYSTROM, J. W., Screw Propellers. *See* STEAM SHIPS.

O.

- OBSERVATORY, Cincinnati, Report of Director, C. Abbe. 8vo. *Cincinnati* 1870.
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Abstract of Patent Cases; by T. M. Goodeve. *London* 1876.

Alphabetical Index of Patents, from 1617 to 1878. 8vo. *London*.

Trial of Patent Causes; by W. Spence. 12mo. *London* 1856.

Subject-matter Index of Patents, from 1617. 8vo. *London*.

International Patent Congress in Vienna, 1873, Report; by H. Grothe, translated by A. Hildebrandt. 8vo. *London* 1875.

Repertory of Patent Inventions, 1846. 8vo. *London*.

Patent Office Library and Museum, Report (Parl. Paper). Folio. *London* 1864.

Action of Patent Laws in promoting invention; by C. D. Abel. 8vo. *London* 1864.

Patent Inventions; by T. Aston. 8vo. *Manchester* 1870.

Patent Inventions; by H. Lund. 12mo. *London* 1851.

Concise View of the Laws connected with Letters Patent; by James and J. H. Johnson. 8vo. *London* 1871.

Patent Law Amendment Act; by W. and J. H. Johnson. 8vo. *London* 1852.

Operation of the Patent Laws; by A. V. Newton. 8vo. *London* 1864.

Patent Monopoly; by H. Dircks. 8vo. *London* 1869.

Patentable Inventions; by W. Spence. 8vo. *London* 1851.

Papers on Patents for Inventions; by St. J. V. Day. 8vo. *Glasgow* 1870.

Present State of Patent Law; by W. Spence. 8vo. *London* 1852.

Inventors' Rights; by E. Barrault (French). 8vo. *Paris* 1863.

Protection for Inventions; by F. J. Bramwell. 8vo. *London* 1875.

Patent Specifications, construction of; by W. Spence. 8vo. *London* 1856.

Patent Specifications, Suggestions for form of Printing; by R. Prosser. 8vo. *Birmingham* 1852.

United States, Introductory Report of Patent Commissioner. 8vo. *Washington* 1864.

— Report of Commissioner of Patents, 1856 to 1871. 8vo. *Washington* 1871.

— Alphabetical List of Patentees and Inventions, from 1880.

Victoria Patents, Abridgments and Specifications, preservation of Food; by W. H. Archer. 8vo. *Melbourne* 1870.

PATENTS, *as under (continued) :—*

Victoria, Patent Index for 1873 ; by the Registrar General. 4to. *Melbourne* 1875.

— Patent Index and Patentees ; by W. H. Archer. 4to. *Melbourne* 1854–1874.

Reprints of 13 Old Specifications and Pamphlets, 1611 to 1799, *as under*. 8vo. *London* 1858 :—

Patent Commission respecting the invention of certain Kilns for Drying Malt ; by Nicholas Page and Sir Nicholas Halse. 1626 and 1635.

Construction of Machines and Weapons of War for land or sea ; by William Drummond. 1626.

Dud Dudley's Metallum Martis, or Iron made with Pit-coal &c. 1620 and 1638.

Metallica, or Diverse new Mechanical Inventions &c. ; by Simon Sturtevant. 1611.

Navigation improved, or the art of Rowing Ships with a more swift and steady motion than oars ; by Thomas Savery. 1796.

New Machine for carrying Ships against wind and tide ; by Jonathan Hulls. 1736.

New Method for extracting Foul Air out of Ships &c. ; by Samuel Sutton. 1744.

Specimina Ichnographica, or several new inventions, &c. ; by John Allen. 1729.

Steam Engines at Gwennap and Werneth ; by Boulton and Watt. 1779 and 1799.

The Miner's Friend, or an Engine to raise Water by fire ; by Thomas Savery. 1698 and 1699.

Treatise of Metallica ; by John Rovinson. 1612.

Water-commanding Engine ; by Marquess of Worcester. 1663.

Water Scoop Wheels ; by William Wheeler. 1642.

PAVEMENTS, Street. *See* ROADS.

PEABODY Breech-Loading Fire-Arms. *See* FIRE-ARMS.

PEARSON, J. M., Self-Acting Weir. *See* HYDRAULICS.

PENETRATION of Iron Armour Plates by Steel Shot ; by Capt. Noble. *See* GUNS.

PERCY, C. M., Winding and Overwinding at Collieries. *See* MINES.

PERCY, J., Metallurgy. *See* METALLURGY.

PERDONNET, A., Kehl Bridge and Mont Cenis Tunnel. *See* RAILWAYS.

PERIODICALS. *See* JOURNALS.

PERIODICITY of Rainfall ; by G. M. Whipple. *See* METEOROLOGY.

PÉRISSE, S., Heating by Gas Furnaces. *See* GAS.

PERMANENT WAY. *See* RAILWAYS.

PERPETUAL MOTION, History of ; by H. Dircks. 12mo. *London* 1861.

- PERRY, J., Elementary Treatise on Steam. *See* STEAM.
- PETIET, J., Locomotive Engine Builder and Driver. *See* LOCOMOTIVES.
- PHILADELPHIA Engineers' Club. *See* TRANSACTIONS.
- PHILADELPHIA, Centennial Exhibition. *See* EXHIBITIONS.
- PHILLIPS, —, Railway Springs. *See* RAILWAYS.
- PHILLIPS, J. A., Composition of Cornish Rocks. *See* MINERALOGY.
- Origin of Mineral Veins. *See* MINES.
- PHILOSOPHICAL Instruments in 1851 Exhibition. *See* EXHIBITIONS.
- PHILOSOPHICAL Magazine and Journal of Science. *See* JOURNALS.
- PHILOSOPHY of Manufactures; by A. Ure. *See* MACHINERY.
- PHIPPS, G. H., Practical Engineering Construction. *See* MECHANICS.
- PHOTOGRAPHY, Manual of Instructions; by Lieut. Abney. 8vo. *Chatham* 1871.
- PHOTOGRAPHY, Specifications. *See* PATENTS.
- PHYSICS**, *as under* :—
- Physical Society. *See* TRANSACTIONS.
- Acoustics applied to Construction of Buildings; by W. F. Barrett. *See* BUILDING.
- Catalogue of Modern Works on Science and Technology; by E. A. Ryder. 8vo. *London* 1880.
- Dictionary of Science; by G. F. Rodwell. 8vo. *London*.
- Expériences des Machines à Feu; by V. Regnault. *Paris* 1870.
- Fragments of Science; by John Tyndall. 8vo. *London* 1879.
- Hydrostatics; by R. Potter. 8vo. *Cambridge* 1859.
- Lectures on Light; by J. Tyndall. 2nd ed. 8vo. *London* 1875.
- Notes of Lectures on Light; by J. Tyndall. 10th ed. 8vo. *London* 1879.
- Miscellaneous Scientific Papers; by W. J. M. Rankine. 8vo. *London* 1881.
- Motion of Fluids in Pipes; by W. Pole. *See* HYDRAULICS.
- Optics; by J. Wood. 8vo. *Cambridge* 1818.
- Physical Constitution of the Sun; by A. Gazan (French). 8vo. *Antibes* 1873.
- Physical Forces, application of; by A. Guillemin. *London* 1877.
- Physics, or Natural Philosophy; by W. Arnett. (2 vols.) 8vo. *London* 1828.
- Potential Energy; by W. J. M. Rankine. 8vo. *Glasgow* 1867.
- Principles of Hydrostatics; by T. Webster. 8vo. *London* 1856.
- Refractive Indices of Glass; by J. Hopkinson.
- Sound; by J. Tyndall. *London* 1875.
- Statics and Dynamics; by T. Baker. 8vo. *London* 1851.
- Theory of Sound; by Lord Rayleigh. Vol. I., 8vo. *London* 1877.
- Transmission of Sound by Wires; by W. J. Millar. 8vo. *Glasgow* 1878.
- Units and Physical Constants; by J. D. Everett. *London* 1879.
- Year-Book of Facts in Science and the Arts; by J. Mason. 19 vols. (from 1861; excepting 1874 and 1877). 8vo. *London*.
- PICARD, H., English-Dutch and Dutch-English Dictionary. *See* DICTIONARIES.

- PILLARS, Cast-Iron, Strength of; by J. B. Francis. *See* MECHANICS.
- PIPES and Tubes, Specifications. *See* PATENTS.
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- PNEUMATIC method of Constructing Foundations; by T. Hughes. *See* BRIDGES.
- PNEUMATIC Despatch; by MM. Mignon and Rouart (French). 4to. *Paris* 1875.
- POCKET-BOOK, Engineer's. *See* MECHANICS.
- POILLON, L., Greindl Rotary Pump. *See* MACHINERY.
- Nijni-Novgorod Water Works. *See* HYDRAULICS.
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Q.

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 Railway Carriages, Specifications. *See* PATENTS.
 Railway Engineer. *See* JOURNALS.
 Railroad Gazette. *See* JOURNALS.
 Railway Record. *See* JOURNALS.
 American and European Railway Practice; by A. L. Holley. 4to. London 1861.
 Roads, Railways, Canals, and Ports of France. *See* ROADS.
 Great Northern Railway, Rules for Engineers and Firemen. 8vo. London 1855.
 Acquisition of Railways by the State; by F. T. Haggard. 8vo. London 1872.
 Album of Railways; by G. Cornet. Paris 1853.
 Railway Almanac. London 1867, 1868, 1869, 1870.
 Railway Amalgamation; by B. Haughton. 8vo. London 1872.
 Railway Appliances; by J. W. Barry. 8vo. London 1878.
 Atmospheric Railway, Report of Committee, House of Commons. Folio. London 1845.

RAILWAYS, as under (*continued*):—

- Austrian Northern Railway, Exhibits at Paris 1878 (German). 8vo. and plates. *Vienna* 1878.
- — — Permanent Way and Works (German and French). 8vo. *Vienna* 1878.
- Railway Accidents, Report of Royal Commission. Folio. *London* 1877.
- Railway Brakes. *See* BRAKES.
- Railway Bridges of Small Span; by W. Anderson. *See* BRIDGES.
- Railway Bridges of Long Span; by B. Baker. *See* BRIDGES.
- Cheap Railways for the Colonies; by J. A. Longridge. 8vo. *London* 1876.
- Railway Construction; by W. C. Unwin. Folio. *Chatham* 1870.
- Construction of Railways in time of War; by P. Lessar (French). *Paris* 1880.
- Duplex Spring Railway Buffers; by A. Allan. 8vo. *Glasgow* 1862.
- Railway Builder; by W. J. Nicolls. *Philadelphia* 1878.
- Car Builder's Dictionary; by M. N. Forney. 8vo. *New York* 1879.
- Railway Carriages; by — Merchant and — Harland. 8vo. *Derby* 1852.
- Two-storied Railway Carriages; by MM. Bournique and Vidard (French). 8vo. *Nancy* 1865, and 4to. *Paris* 1867.
- Railway Axleboxes and Journals with Rolling Friction; by J. B. Vidard (French). *See* FRICTION.
- Brazilian Railways in 1879; by F. P. Passos (Spanish). 8vo. and map. *Rio de Janeiro* 1880.
- Brunot's Recording Indicator for the Running of Trains; by R. Vion (French). 8vo. *Amiens* 1875.
- Channel Railway between England and France; by J. Chalmers. 8vo. *London* 1861.
- Continuous Electric Communication in Trains whilst running; by E. de Baillehache (French). 8vo. *Paris* 1878.
- Cyclograph for setting out Railway Curves; by R. Price Williams. 4to. *London* 1849.
- Railway Disc Signals without Counterweight, and Lamps without Pulleys or Chains; by J. Baranowski (French). 4to. *Turin* 1864.
- Railway Fish-Joints; by A. Malberg (German). 4to. *Berlin* 1853.
- Gauge Commissioners' Report. Folio. *London* 1846.
- — — Evidence. Folio. *London* 1846.
- Method of overcoming Steep Gradients; by H. Handyside. 8vo. *London* 1874.
- Hydraulic Railway; by J. G. Shuttleworth. 8vo. *London* 1842.
- Railways of Great Britain and Ireland; by F. Wishaw. 4to. *London* 1840.
- Indian Railways; by J. P. Kennedy. Folio. *London* 1875.
- Railways of the United States, Report; by Captain Douglas Galton. Folio. *London* 1857.
- Chemins de fer en Amérique; by Lavoinnie and Pontzen. *Paris* 1880.

RAILWAYS, as under (continued):—

- Report on Russian Railways (Russian). 4to. 1878.
- Train Mileage and Duty on Indian Railways; by C. E. Cardew. Folio. *Agra* 1879.
- Working of the Southern Railway of Austria in 1876; by A. Gottschalk. 8vo. *Paris* 1878.
- Railways in Ireland, Commissioners' Report. Folio. *London* 1868.
- Light Railways in Sweden; by C. P. Sandberg. 4to. *London* 1870.
- Light Railways; by C. D. Fox. 8vo. *London* 1867.
- Post and Rail-Way; by H. T. Humphreys. 8vo. *Limerick* 1870.
- Practical Treatise on Railways; by P. Lecount. 8vo. *Edinburgh* 1839.
- Practical Treatise on Railroads; by N. Wood. *London* 1838.
- Railway Works of New South Wales. See AUSTRALIA.
- English Railways and the State; by C. de Franqueville (French). 8vo. *Paris* 1880.
- Observations on a General Iron Railway. *London* 1823.
- Narrow Gauge Railways; by C. E. Spooner. 8vo. *London* 1879.
- Railway Machinery; by D. K. Clark. 2 vols., with plates, folio. *Edinburgh* and *New York* 1855.
- Railway Management.
- Locomotive Engines upon Railways; by F. M. G. de Pambour. See LOCOMOTIVES.
- Exploitation des Chemins de fer par l'Etat; by F. Jacquemin. 8vo. *Paris* 1878.
- Political Economy of Railroads; by H. Fairbairn. 8vo. *London* 1836.
- Railway Department of Board of Trade, Report. Folio. *London* 1842.
- Eastern Counties Railway, Committee's Report. Folio. *London* 1855.
- South Eastern Railway, position and projects. 8vo. *London* 1846.
- Railway Charges and the Authority of the State; by L. Aucoc. 8vo. *Paris* 1880.
- Railway Economy; by D. Lardner. 8vo. *London* 1850.
- Railway Economy; by L. Le Chatelier, translated by L. D. B. Gordon. See BRAKES.
- Railway Facts and Lower Fares; by F. T. Haggard. 8vo. *London* 1869.
- London and North Western Railway, Report of Committee of Consultation. 1856.
- Railways before Parliament; by E. Level. 8vo. *Paris* 1880.
- Early History of Liverpool and Manchester Railway; by T. Ashbury. 8vo. *Manchester* 1880.
- Permanent Way, Rolling Stock, &c.; by C. Couche. 4 vols. *London* and *Paris* 1878.
- Re-railing Apparatus for Derailments; by F. Mathias (French). 4to. *Paris* 1878.

RAILWAYS, as under (*continued*):—

- Regulations to be observed by Enginemen, Signalmen and others, as to Panel Signals. 1842.
- Lectures on Rhine Bridge and Tunnel through the Alps; by A. Perdonnet (French). 8vo. *Paris* 1864.
- Railway Springs; by — Phillips (French). *Paris*. 8vo. 1852.
- Experiments on Strength of Iron Rails; by C. P. Sandberg. *See* IRON.
- Railway Permanent Way, Mallet's Buckled Plates. 8vo. *London* 1868.
- Safety of Permanent Way; by C. P. Sandberg. 8vo. *London* 1874.
- Joint Chair for Bridge Rails; by W. Anderson. 8vo. *Dublin*.
- Manufacture and Wear of Rails; by C. P. Sandberg. 8vo. *London* 1868.
- Trials of Strength of Rails; by T. Weishaupt (German). 4to. *Berlin* 1852.
- Railways and Railway Signalling, &c.; by Captain Tyler. Folio. *Chatham* 1872.
- Railroads and Carriages; by T. Tredgold. *London* 1835.
- Roof Lamp for Railway Carriages; by A. Allan. 8vo. *Glasgow* 1862.
- Wrought-Iron Sleepers; by A. Legrand. 4to. *Mons* 1868.
- Application of Iron to Railway Structures, Commissioners' Report. 2 parts, folio. *London* 1849.
- Submarine Communication between England and France. 8vo. *Dublin* 1858.
- Index to the Railway System; by W. Fleming. 3 vols. *London* 1875–76–78.
- Stockton and Darlington Railway Jubilee Memorial; by J. S. Jeans. 8vo. *London* 1875.
- Railway Engine and Carriage Wheels; by H. B. Barlow. *London* 1848.
- RAISING**, Lowering, and Weighing; Specifications. *See* PATENTS.
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- Second Law of Thermo-dynamics. *See* HEAT.

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- RECLAIMED Land at Wexford Harbour; by W. Anderson. 8vo. *Dublin* 1864.
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- RETAIL Traders and Co-operative Stores; by J. Head. 8vo. *Middlesbrough* 1872.

REULEAUX, F., *Der Constructeur*. See MECHANICS.

— Theoretical Kinematics. See MECHANICS.

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REVUE Industrielle. See JOURNALS.

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RIVERS, as under :—

Hydraulics of Great Rivers; by J. J. Révy. See HYDRAULICS.

Indian River Navigation; by J. Bourne. 8vo. London 1849.

River Pollution; by R. G. Coke. 8vo. London 1874.

Lowering of the Flood Level in the Lake of Constance; by A. Achard. 8vo. Paris 1880.

Report on the Hydrography, Hydrology, and Hydraulics of the Irrawaddy River; by R. Gordon. 3 vols., 4to. Rangoon 1879.

Report upon the Mississippi; by Capt. A. A. Humphreys and Lieut. H. L. Abbot. Philadelphia 1861.

Report on Purification of Rivers; by D. Curror. Folio. Edinburgh 1872.

Purification of River Seine; by the Commission of Enquiry (French). Paris 1876.

River Tyne Improvements; by T. J. Taylor. 4to. London and Newcastle 1851.

RIVETED Joints, Strength of Single-Riveted Lap Joints; by B. B. Stoney. 4to. Dublin 1875.

RIVETED Joints, Translation of Report; by F. Loewe. 8vo. Wien 1880.

ROADS, as under :—

Construction of Roads and Streets; by H. Law and D. K. Clark. 12mo. London 1877.

Road Making and Repairing; by E. Leahy. 12mo. London 1847.

Road Progress; by W. B. Adams. 8vo. London 1850.

Economy of Steam Road Rollers; by F. A. Paget. 8vo. London 1865.

Construction of Roads. 2nd part. (French.) Folio. Paris 1850-1851.

ROADS, as under (continued) :—

- Roads, Railways, Canals, and Ports of France; by M. F. Lucas (French). 8vo. *Paris* 1873.
- Steam on Common Roads. *See* STEAM ENGINE.
- ROBERTS, R., Improvements in Vessels. *See* SHIPBUILDING.
- ROBERTSON, T., Treasurer's Financial Statement, New South Wales. *See* AUSTRALIA.
- ROBINSON, C., Account of New South Wales. *See* AUSTRALIA.
- ROBINSON, H., Purification of Water-carried Sewage. *See* SEWAGE.
- Sewage Disposal. *See* SEWAGE.
- ROCHESTER Road Bridge, Cylinder Foundations. *See* BRIDGES.
- ROCK Boring Machinery, McKean's; by P. and W. MacLellan. *See* BORING.
- ROCK Drilling; by R. Schram. *See* BORING.
- ROCKS, Composition of Cornish Rocks. *See* MINERALOGY.
- RODWELL, G. F., Dictionary of Science. *See* PHYSICS.
- ROGERS, S. B., Elementary treatise on Iron. *See* METALLURGY.
- ROLLING Mills, Reversing. *See* MACHINERY.
- ROLLING of Ships. *See* SHIPS.
- RONALDS Catalogue of Works on Electricity, &c. *See* ELECTRICITY.
- ROOF and Bridge Structures. *See* BRIDGES.
- ROOF Lamp for Railway Carriages; by A. Allan. *See* RAILWAYS.
- ROPER, R. S., Desulphurisation of Coke. *See* COKE.
- ROSSET, G., Strength of Metals used for Guns. *See* GUNS.
- ROSTHORN, J. de, Iron Trade of Carinthia. *See* IRON.
- ROUART, —, Pneumatic Despatch. *See* PNEUMATIC.
- ROUEN Industrial Society. *See* TRANSACTIONS.
- ROUEN Universal Exhibition 1855. *See* EXHIBITIONS.
- ROVINSON, J., Metallica. *See* PATENTS.
- ROWAN, F. J., Auto-kinetic Telegraph System. *See* TELEGRAPHS.
- Boiler Incrustation. *See* BOILERS.
- ROWELL, Messrs., Catalogue of Iron, Wire, Wire Rope, and Fencing. *See* IRON.
- ROWLANDSON, J., History of the Steam Hammer. *See* MACHINERY.
- ROYAL Institutions and Societies. *See* TRANSACTIONS.
- RÜHLMANN, M., Treatise on Machinery. *See* MACHINERY.
- Hydro-Mechanics. *See* HYDRAULICS.
- RULES, Tables, Data, and Formulæ. *See* MECHANICS.
- RUMBLE, T. W., Southwark and Vauxhall Water Works. *See* HYDRAULICS.
- RUNDALL, Col. F. H., Water Works. *See* HYDRAULICS.
- RUSSELL, J. B., Glasgow Improvement Trust. *See* GLASGOW.
- RUSSELL, J. Scott, Fleet of the Future. *See* SHIPS.
- Naval Architecture. *See* SHIPS.
- Steam Navigation. *See* STEAM SHIPS.
- Treatise on the Steam Engine. *See* STEAM ENGINE.

RUSSIA, as under :—

Russian Railways. *See* RAILWAYS.

— Locomotives. *See* LOCOMOTIVES.

— Dictionary. *See* DICTIONARIES.

RYDER, E. A., Catalogue of Modern Works on Science and Technology.
See PHYSICS.

RYLAND'S Iron Trade Circular. *See* JOURNALS.

S.

SAFES, &c., Specifications. *See* PATENTS.

SAFETY of Permanent Way ; by C. P. Sandberg. *See* RAILWAYS.

SAHARA, Artesian Wells in Oriental Sahara ; by C. Laurent. *See* BORING.

— Borings executed in Oriental Sahara ; by C. Laurent. *See* BORING.

SAINT Quentin Industrial Society. *See* TRANSACTIONS.

SANDARS, S., Elements of Taxation. *See* TAXATION.

SANDBERG, C. P., Wrought Iron and Steel, K. Styffe's treatise. *See* IRON.

— Manufacture and Wear of Rails. *See* RAILWAYS.

— Safety of Railway Permanent Way. *See* RAILWAYS.

— Experiments on Strength of Iron Rails. *See* RAILWAYS.

SANDERS, R. D., Atmospheric Brake. *See* BRAKES.

SANDERS and Bolitho Continuous Brake. *See* BRAKES.

SANITARY Engineering ; by B. Latham. *See* SEWAGE.

SANITARY Congress at Stafford. *See* SEWAGE.

SASSOON Mechanics' Institute, Bombay. *See* TRANSACTIONS.

SATURATED Vapours, Expansion ; by W. J. M. Rankine. *See* STEAM.

SAVERY, T., Navigation improved. *See* PATENTS.

— Miners' Friend. *See* PATENTS.

SAWYER, T. S., Machinery for Shearing, Riveting, &c. *See* MACHINERY.

SAXON Engineers' Society. *See* TRANSACTIONS.

SCANDINAVIA, Rise of Land. *See* NORWAY.

SCANTLING of Iron Steam Vessels ; by J. Price. *See* STEAM SHIPS.

SCHEUTZ, G. and E., Swedish Calculating Machine. *See* INSTRUMENTS.

SCHINZ, C., Blast Furnace. *See* BLAST FURNACES.

SCHNEIDER'S Catalogue, Paris Exhibition 1878. *See* EXHIBITIONS.

SCHRAM, R., Rock Drilling. *See* BORING.

SCHRÖN, L., Tables of Logarithms. *See* TABLES.

SCHÜBLER, A., Construction of Bridge Girders. *See* BRIDGES.

SCIENCE and Technology, Catalogue of modern works ; by E. A. Ryder.
See PHYSICS.

SCOTLAND, Institution of Engineers and Shipbuilders. *See* TRANSACTIONS.

SCOTT, M., Projectiles and Guns. *See* GUNS.

SCOTTISH Society of Arts, Royal. *See* TRANSACTIONS.

SCREW Propellers. *See* STEAM SHIPS.

SCREW Steamers. *See* STEAM SHIPS.

SCROLL Drum; by G. Fowler. *See* MINES.

SEA, means of determining Depth of Sea. *See* DEPTH.

SEAPORTS of France. *See* HARBOURS.

SECTIONS of Iron. *See* IRON.

SEDDON, Capt., Building Trades and Construction. *See* BUILDING.

SEDDON, J. P., Architecture applied to Military Buildings. *See* ARCHITECTURE.

SEINE, Purification. *See* RIVERS.

SERGUEEFF, N., Bleaching of Linen. *See* BLEACHING.

SERVO-MOTEUR Farcot et ses applications; by É. Barrault. *See* MACHINERY.

SEWAGE, as under :—

Drainage of Dudley, Report; by H. J. Marten and F. C. Stileman. Folio. *Wolverhampton* 1876.

Drainage of London; by J. W. Bazalgette. 8vo. *London* 1875.

Metropolitan Main Drainage Report; by Messrs. Hawksley, Bidder, and Bazalgette. Folio. *London* 1858.

House Drainage, Sewerage, and Ventilation; by R. E. Middleton. 8vo. *London* 1881.

Sewage; suggestions for its utilisation. *London* 1872.

Water Supply and Sewage; by Dr. Corfield. *Chatham*.

Sewage Disposal; by H. Robinson. 8vo. *London* 1880.

London Sewage Co., Report; by T. Wicksteed. 8vo. *London* 1845.

Purification of Water-carried Sewage; by H. Robinson and J. C. Melliss. 8vo. *London* 1877.

Sanitary Engineering; by B. Latham. Folio. *Chatham* 1871.

Sanitary Engineering; by B. Latham. 8vo. *London* 1877.

Sewage Irrigation by Farmers; by R. Peregrine Birch. 8vo. *London* 1878.

Utilisation of Sewage by Phosphate process; by Dr. Forbes. 8vo. *London* 1871.

Sewage Works, Coventry; by the Rivers Purification Association. *London* 1877.

Sewerage of Providence City; by J. H. Shedd. 8vo. *Providence* 1874.

Sanitary Congress at Stafford; report by the Sanitary Institute. 8vo. *London* 1878.

SEWING, &c., Specifications. *See* PATENTS.

SEXE, S. A., Rise of Land in Scandinavia. *See* NORWAY.

SHAFTS of Mills; by R. Buchanan. *See* MACHINERY.

SHARP, H., Treatment of Steel Plates. *See* STEEL.

SHEDD, J. H., Sewerage of Providence City. *See* SEWAGE.

SHEFFIELD Water Works, Bradfield Reservoir. *See* HYDRAULICS.

SHELLEY, C. P. B., Whitworth Measuring Machine. *See* MEASURES.

SHIPS, as under :—(see also *Steam Ships*.)

Shipbuilding, Specifications. See **PATENTS**.

Bevelling of Iron Frames in Shipbuilding; by W. J. M. Rankine. 4to. *London* 1865.

Principles and Progress of Iron Shipbuilding; by W. Fairbairn. 8vo. *London* 1865.

Modern system of Naval Architecture; by J. Scott Russell. Plates, folio. *London* 1865.

Lloyd's Rules for Iron Ships. 4to. *London* 1863.

Iron Ship Construction, comparative merit of Rules of Lloyd's and Liverpool Underwriters; by J. Price. 8vo. *Glasgow* 1867.

Mathematical Theory of Stream Lines; by W. J. M. Rankine. 4to. *London* 1870.

Manual of Naval Architecture; by W. H. White. 8vo. *London* 1877.

Waves which travel along with Ships; by W. J. M. Rankine. 4to. *London* 1868.

Improvements in Vessels; by R. Roberts. 4to. *Manchester* 1853.

Decimal Measurement in Iron Shipbuilding; by H. H. West. 4to. *London* 1878.

Catalogue of Ship Models in South Kensington Museum. 8vo. *London* 1874.

Resistance of Ships, by W. J. M. Rankine. 4to. *London* 1864.

Approximate Formulæ for Naval Construction; by J. A. Normand. 4to *Paris*.

Naval Architecture; by — Wazon. 8vo. *Paris* 1880.

Admiralty Trials of H.M.S. *Greyhound*; by W. Froude. 8vo. *London* 1874.

Resistance of Ships; by W. Froude. 8vo. *London* 1862.

Resistance and Rolling of Ships; by W. Froude. 8vo. *London* 1872.

Rolling of Ships; by W. Froude. 4to. *London* 1863.

The Fleet of the Future; by J. Scott Russell. 2 vols. 8vo. *London* 1862.

Our Commercial Steam Fleet in 1877; by J. R. Ravenhill.

Our Ironclad Ships; by E. J. Reed. *London* 1869.

Theory of Vessels; by L. Euler, translated by H. Watson. *London* 1796.

Ships' Compasses; by J. R. Napier. See **INSTRUMENTS**.

Compensation for Deviations of Compass; by A. Arson (French). 8vo. *Paris* 1871.

SHIPTON, J. A., Reciprocating Steam Engine. See **STEAM ENGINE**.

SHOOLBRED, J. N., Present state of Electric Lighting. See **ELECTRICITY**.

— Electric Lighting and its Practical application. See **ELECTRICITY**.

SHOT. See **GUNS**.

SHUTTLEWORTH, J. G., Hydraulic Railway. See **RAILWAYS**.

SICKELS v. BORDEN; arguments in the case. 8vo. *New York* 1856.

SIEBE and Gorman's Diving Apparatus. See **DIVING**.

SIEMENS, C. W., Determination of Depth of Sea. See **DEPTH**.

— Dynamo-Electric Current, in its application to Metallurgy, to Horticulture, and to Locomotion. See **ELECTRICITY**.

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SIMPSON, J., Reciprocating Steam Engine. *See* STEAM ENGINE.

SKINS, &c., Specifications. *See* PATENTS.

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SLIP in Screw Steamers. *See* STEAM SHIPS.

SMEATON'S Reports. *See* ENGINEERING.

SMELTING Iron and Steel ; by C. W. Siemens. *See* IRON.

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SMOKE Prevention ; by T. S. Prideaux. *See* BOILERS.

SMOKE Question ; by C. W. Siemens. 8vo. London 1880.

SMOKE Consuming Grates for Boilers. *See* BOILERS.

SOCIAL Science Congress, Address by T. Hawksley, President. *See* ADDRESSES.

SOCIETY of Arts. *See* TRANSACTIONS.

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SOCIETY of Engineers. *See* TRANSACTIONS.

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Spanish Dictionary (Neuman and Baret's). *See* DICTIONARIES.

Water Supply in Eastern Provinces. *See* HYDRAULICS.

SPECIMINA Ichnographica; by J. Allen. *See* PATENTS.

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SPENCE, W., Trial of Patent Causes. *See* PATENTS.

— Patentable Inventions. *See* PATENTS.

— Present state of Patent Law. *See* PATENTS.

— Construction of Patent Specifications. *See* PATENTS.

SPICE, R. P., Gas Arbitration, Ryde. *See* GAS.

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— Mechanical Gas Stoking. *See* GAS.

— Presidential Address, British Association of Gas Managers. *See* ADDRESSES.

— — — Society of Engineers. *See* ADDRESSES.

— Water Gas. *See* GAS.

SPINNING Machinery. *See* MACHINERY.

SPON'S Dictionary of Engineering. *See* DICTIONARIES.

— Engineers' and Contractors' illustrated book of prices. 2 vols., 4to. *London* 1876 and 1881.

SPOONER, C. E., Narrow Gauge Railways. *See* RAILWAYS.

SPRINGS for Railways. *See* RAILWAYS.

STABILITE des Revêtements; by Poncelet. *See* BUILDING.

STAFFORD Water Works. *See* HYDRAULICS.

STANNAH, —, Tables of Weights of Angle and Tee Iron. *See* TABLES.

STATICS and Dynamics; by T. Baker. *See* PHYSICS.

STATISTICAL Register of New South Wales. *See* AUSTRALIA.

STATISTICAL Society. *See* TRANSACTIONS.

STEAM, *as under* :—

Steam and the use of the Indicator; by J. C. Graham. *London* 1877.

Steam and Heated Air in Locomotives; by R. Eaton. *See* LOCOMOTIVES.

Steam Boiler. *See* BOILERS.

Steam Engine as a heat machine; by J. H. Cotterill. 8vo. *London* 1878.

Density of Steam; by W. Fairbairn and T. Tate. 4to. *London* 1860.

Density of Steam; by W. J. M. Rankine. 4to. *Edinburgh* 1862.

Elementary treatise on Steam; by J. Perry. 12mo. *London* 1874.

Expansion of Saturated Vapours; by W. J. M. Rankine. 8vo. *Glasgow* 1866.

STEAM, *as under (continued) :—*

Expansion of Superheated Steam; by W. Fairbairn and T. Tate. 4to.
London 1862.

New Theory of Steam Generation; by E. J. Reed. 8vo. *Liverpool* 1863.

History of the Steam Hammer; by J. Rowlandson. *See* MACHINERY.

Heating Water and Condensing Steam in Tubular and Double-Cased Vessels;
by W. Anderson. 8vo. *London* 1871.

Steam Indicator and Dynamometer; by T. J. Main and T. Brown. *See*
INSTRUMENTS.

Martin's Steam-Engine Indicator; by P. Garnier. *See* INSTRUMENTS.

Steam Ships and Steam Navigation; by J. S. Russell. *See* STEAM SHIPS.

Steam Road Rollers. *See* ROADS.

STEAM ENGINE, *as under :—*

Steam Engines, Specifications. *See* PATENTS.

The Steam Engine; by J. Bourne. 4to. *London* 1861.

— — — by John Farey. 4to. *London* 1827.

— — — by T. M. Goodeve. 8vo. *London* 1879.

— — — by John Milne. *Edinburgh* 1830.

— — — by J. Scott Russell. 8vo. *Edinburgh* 1841.

— — — by F. M. G. de Pambour. 8vo. *London* 1839.

— — — by W. C. Unwin. Folio. *Chatham* 1869.

Descriptive history of the Steam Engine; by R. Stuart. *London* 1824.

The Steam Engine and its Inventors; by R. L. Galloway. 8vo. *London* 1881.

The Steam Engine and other Prime Movers, Manual; by W. J. M. Rankine.
12mo. *London* 1873.

Handbook of the Steam Engine; by J. Bourne. 12mo. *London* 1865.

Catechism of the Steam Engine; by J. Bourne. 12mo. *London* 1847.

Steam Engine of the Future; by J. Bourne. 4to. *London* 1879.

Examples of modern Steam, Air, and Gas Engines; by J. Bourne. *London*
1878.

Steam on Common Roads; by C. F. T. Young, A. L. Holley, and J. K. Fisher.
8vo. *London* 1860.

Action of forces on the Crank of the Steam Engine; by W. Pole. *London* 1852.

Allen Engine and Porter Governor. 4to. *New York* 1870.

High-pressure Steam Engine; by E. Alban, translated by W. Pole. 8vo.
London 1848.

Loss by Friction in the Steam Engine; by W. Pole. 4to. *London* 1843.

Mechanical Theory of the Steam Engine; by T. Baker. 8vo. *London* 1862.

Most economical rates of Expansion in the Steam Engine; by W. J. M.
Rankine. 4to. *London* 1866.

Practical Illustrations of Land and Marine Engines and Boilers; by N. P.
Burgh. Folio. *London* 1864.

STEAM ENGINE, *as under (continued) :—*

- Practical treatise on the Steam Engine ; by A. Rigg. 4to. *London* 1878.
 Theory of the Steam Engine ; by F. M. G. de Pambour. 8vo. *London* 1838.
 Chemistry of the Steam Engine ; by T. Craddock. 8vo. *London* 1847.
 Cornish Engine Reporter ; by T. Lean. 1849–1850.
 Cornish Pumping Engine ; by W. Pole. 4to, with folio plates. *London* 1844.
 Expansive Steam Engine, principles and application ; by P. R. Hodge. 4to.
London 1849.
 Steam Engine Expansion Gear ; by — Correy (French).
 — — — — — by C. Hauvel (French). 8vo. *Bar-sur-Seine* 1878.
 Variable Expansion Gear ; by L. Guinotte (French). Part. I. 8vo. *Mons* 1871.
 Engine Governors ; by G. Marié (French). 8vo. *Paris* 1879.
 Marine Engine Construction and Classification ; by C. Atherton. 8vo.
London 1851.
 Latest improvements in Marine Engines and Boilers ; by J. R. Ravenhill.
Glasgow 1879.
 Marine Steam Engine ; by T. Tredgold. 2 vols., folio. *London* 1851.
 Notes on model of Newcomen Engine.
 Engines made by T. and T. Powell (French). 8vo. *Rouen* 1877.
 How to Manage a Steam Engine ; by M. P. Bale. 8vo. *London* 1880.
 The Worthington Steam Pumping Engine ; by H. R. Worthington. 8vo.
New York 1876.
 Trial of Engine and Boilers at Messrs. Nuttall's ; by M. Longridge. 4to.
Manchester 1881.
 Trial of Rotative Compound Beam Engines ; by J. Simpson & Co. 4to. 1880.
 Steam Engines at Gwennap and Werneth ; by Boulton and Watt. *See*
 PATENTS.
 Report of Parliamentary Committee on Marine Engines. Folio. *London* 1859.
 Reciprocating Steam Engine ; by J. Simpson and J. A. Shipton. 8vo.
Manchester 1849.
 Regenerative Steam Engine ; by C. W. Siemens. 8vo. *London* 1856.
 Relative merits of Simple and Compound Steam Engines ; by N. McDougall.
 8vo. *London* 1875.
 New forms of Piston ; by P. Giffard (French). 8vo. *Paris* 1878.
 Designing of Valve-Gearing ; by E. J. C. Welch. 12mo. *London* 1875.
 Slide-Valve Gears ; by H. Bilgram. 16mo. *Philadelphia* 1878.
 Valve Gears for Stationary Engines ; by E. Cornut (French). 8vo., and 4to.
 plates. *Lille* 1880.
 Three-Cylinder Steam Engine ; by — Correy (French). *Rouen* 1878.
 Valve Gears ; by G. Zeuner (Müller's translation.) *London* 1869.
STEAM SHIPS, *as under :—(see also Ships.)*
 Action of Propellers ; by W. J. M. Rankine. 4to. *London* 1865.

STEAM SHIPS, as under (*continued*):—

Apparent Negative Slip in Screw Steamers; by W. J. M. Rankine. 4to. *London* 1867.

Application of inventions of Watt to Steam Navigation; by J. Scott Russell. 8vo. *London* 1867.

Architecture navale; by — Wazon. *See SHIPS.*

Balanced Rudder for Screw Steamers; by W. J. M. Rankine. 4to. *London* 1866.

Capability of Steam Ships; by C. Atherton. 8vo. *Woolwich* 1853.

Experimental Researches in Steam Engineering; by B. F. Isherwood. 2 vols. 4to. *Philadelphia* 1863.

Steam Ship Efficiency; by R. Mansel.

High-Speed Steam Navigation; by R. Armstrong. 8vo. *London* 1859.

Engineering Precedents for Steam Machinery; by B. F. Isherwood. *New York* 1859.

Instructions as to Survey of Hull &c. of Steam Ships; by the Admiralty. *London* 1878.

Marine Propulsion; by W. R. Eckart. 4to. *London* 1872.

Original Invention of Steam Navigation, memorial and correspondence; by J. Taylor. 4to. *Cumnoek* 1824.

Machinery of the “Arabia” and “La Plata”; by D. Kirkaldy. Folio. *London* 1852.

Our Commercial Steam Fleet in 1877; by J. R. Ravenhill.

Power and Speed of Steam Vessels; by W. Bury. 4to. *London* 1878.

Quick Steam Launches; by F. J. Bramwell. 4to. *London* 1872.

Results of Trials made in H.M. Screw Ships and Vessels; by the Admiralty. Folio. *London* 1880.

Ocean Palace principle of Steam Ship; by R. Wilcox. 8vo. *Melbourne*.

Scantling of Iron Steam Vessels; by J. Price. 8vo. *Glasgow* 1869.

Screw Propeller; by R. Wilson. 8vo. *Glasgow* 1860.

Screw Propellers and their Steam Engines; by J. W. Nystrom. 8vo. *Philadelphia* 1852.

Treatise on the Screw Propeller; by John Bourne. 4to. *London* 1852.

Steam Ships and Steam Navigation; by J. Scott Russell. *Edinburgh* 1841.

Steam Machinery in steamer “Gallatin”; by C. E. Emery.

Steam Raft; by G. Catlin. 8vo. *Manchester* 1860.

Stern Propeller for Steam Vessels; by J. Maudslay. 8vo. *London* 1870.

War Ships and Navies of the World; by J. W. King. 8vo. *Boston* 1881.

STEEL, as under :—

Evidence for prolongation of Whitworth Patent for Fluid-Compressed Steel. 4to. 1879.

Compressed Steel and Rifled Guns; by Sir J. Whitworth. 4to. *London* 1873.

Steel and Iron for constructive purposes; by D. Adamson. *See IRON.*

STEAM SHIPS, as under (*continued*):—

- Bessemer Steel; by J. Birch. 8vo. *Manchester* 1868.
- Manufacture of Cast Steel; by M. S. Jordan (French). 8vo. *Paris* 1869.
- Management of Steel; by G. Ede. *London* 1873.
- Manufacture of Steel; by M. L. Gruner (Smith's translation). *New York* 1872.
- Employment of Steel in Construction; by J. Barba (French). *Paris* 1875.
- Experiments on Mechanical and other properties of Steel; by a Committee of Civil Engineers. Folio. *London* 1863.
- Admiralty Tests of Mild Steel. Folio plates. *London* 1880.
- Experiments on Steel; by T. W. Traill. 8vo. *London* 1881.
- Mechanical properties of Fagersta Steel, Experimental enquiry; by D. Kirkaldy. 4to. *London* 1873.
- Steel: its History, Manufacture, and Uses; by J. S. Jeans. 8vo. *London* 1880.
- Krupp Steel, objects exhibited at Vienna 1873. 8vo. *Essen* 1873.
- Manufacture and mode of Working of Steel; by D. Chernoff, translated by W. Anderson. 8vo. *London* 1876.
- Steel Manufacture by Heaton's process. *See IRON.*
- Treatment of Steel Plates; by H. Sharp. 8vo. *London* 1868.
- Penetration of Iron Armour Plates by Steel Shot. *See GUNS.*
- Structure of Cast-Steel Ingots; by D. Chernoff. (Russian. Translated by W. Anderson, *Proc. Inst. Mech. Eng.*, 1880, pp. 152-183.) 8vo. *St. Petersburg* 1879.
- STEPHENSON, Life of George Stephenson; by S. Smiles. 8vo. *London* 1857.
- STEPHENSON, G. R., Address, Institution of Civil Engineers. *See ADDRESSES.*
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- Theory of Strains in Girders and similar structures. *See MECHANICS.*
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- STÖRMER, F., Machines suitable for Norwegian Industries. *See NORWAY.*
- STREAM LINES, Mathematical Theory; by W. J. M. Rankine. *See SHIPS.*
- STREETS. *See ROADS.*

- STREET PAVEMENTS; by G. J. C. Dawson. *See* ROADS.
- STREINTZ, H., Elastische Nachwirkung. *See* MECHANICS.
- STRENGTH and Deflection of Beams; by W. Pole. *See* BRIDGES.
- STRENGTH and Elasticity of Materials. *See* MECHANICS.
- STRENGTH and Explosions of Boilers; by W. Fairbairn. *See* BOILERS.
- STRENGTH of Cast Iron and other Metals; by T. Tredgold. *See* IRON.
- STRENGTH of Limes, Cements, Mortars, &c.; by G. Pasley. *See* CEMENTS.
- STRENGTH of Metals used for Guns. *See* GUNS.
- STRESS of Timber; by P. Barlow. *See* TIMBER.
- STRESSES produced by rapid Rotation of an Elastic Disc. *See* MECHANICS.
- STRUCTURES and Materials, Strength of. *See* MECHANICS.
- STRUVE, Index of Double Stars; by Lord Lindsay. *See* ASTRONOMY.
- STRYPE, W. G., Sulphuric Acid Manufacture. *See* CHEMISTRY.
- STUART, R., Descriptive history of the Steam Engine. *See* STEAM ENGINE.
- STUDIES of Blast-Furnace Phenomena; by M. L. Gruner. *See* BLAST FURNACES.
- STURTEVANT, S., Metallica. *See* PATENTS.
- STYFFE, K., Iron and Steel. *See* IRON.
- SUBMARINE Communication between England and France. *See* RAILWAYS.
- SUBMARINE Telegraphy. *See* TELEGRAPHY.
- SUEZ CANAL. *See* CANALS.
- SUGAR, Specifications. *See* PATENTS.
- SUGAR Factory at Aba-el-Wakf; by W. Anderson. 8vo. *London* 1873.
- SUGAR Manufacture; by J. Johnston. 8vo. *London* 1847.
- SULPHATES and Lime Mortar; by Graham Smith. *See* CEMENTS.
- SULPHURIC ACID Manufacture; by W. G. Strype. *See* CHEMISTRY.
- SUN, Physical Constitution. *See* PHYSICS.
- SURVEYING, as under:—**
- Survey of Adirondack Wilderness. *See* UNITED STATES.
- Surveying and Levelling Instruments. *See* INSTRUMENTS.
- Surveying, Principles and Practice; by C. Bourns. 8vo. *London* 1843.
- Surveyors, Institution. *See* TRANSACTIONS.
- SUTRO, A., Tunnel to Comstock Lode, Nevada. *See* MINES.
- SUTTON, S., Extracting Foul Air out of Ships. *See* PATENTS.
- SWAN, J. G., Indians of Cape Flattery. *See* UNITED STATES.
- SWEDEN, as under:—**
- Swedish Calculating Machine. *See* INSTRUMENTS.
- Swedish Engineers' Society. *See* TRANSACTIONS.
- Swedish Iron Brands. *See* IRON.
- Swedish Plates, Strength. *See* MECHANICS.

T.

TABLES, as under :—

- Der Ingenieur (Tables, Formulæ, and Rules); by J. Weisbach (German). 8vo. *Braunschweig* 1860 and 1861.
- Logarithms; by L. Schrön. 8vo. *Braunschweig* 1860.
- Metrical Tables; by G. L. Molesworth. 16mo. *London* 1880.
- Rules, Tables, and Data; by D. K. Clark. 8vo. *London* 1877.
- Tables and Formulæ; by J. Claudel. 8vo. *Paris* 1845.
- Strength and Deflection of Timber; by W. Lea. 8vo. *London* 1850.
- Weights of Angle and Tee Iron, Tables for Engineers; by — Stannah. Folio. *London* 1867.
- Multiplication Tablets on S. Slominski's theorem; by H. Knight. 8vo. *Birmingham* 1847.
- Useful Rules and Tables; by W. J. M. Rankine. 8vo. *London* 1876.
- TANGYE Brothers, catalogue of Machinery and Tools. *See* MACHINERY.
- TAPPING and Drilling Machines for Firebox Screw-Stay Holes; by F. Mathias. *See* LOCOMOTIVES.
- TARBUCK, E. L., Handbook of House Property. *See* HOUSE.
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- TATE, T., Density of Steam. *See* STEAM.
- Expansion of Superheated Steam. *See* STEAM.
- Glass Globes and Cylinders. *See* GLASS.
- TAXATION, Elements of Taxation; by S. Sandars. 8vo. *London* 1850.
- TAYLOR, J., Invention of Steam Navigation. *See* STEAM SHIPS.
- TAYLOR, T. J., Archæology of the Coal Trade. *See* COAL.
- Improvements of the Tyne. *See* RIVERS.
- TECHNICAL Valuation &c. of Coal Gas; by W. R. Bowditch. *See* GAS.
- TECHNOLOGICAL Dictionary. *See* DICTIONARIES.
- TECHNOLOGY, Handbook of; by D. Hartig. *See* MECHANICS.
- TECHNOLOGY and Science, catalogue of modern works; by E. A. Ryder. *See* PHYSICS.
- TEETH of Wheels; by M. Camus. *See* MACHINERY.
- TELEDYNAMIC Transmission of Power. *See* POWER.
- TELEGRAPHY**, as under :—
- Telegraphic Journal. *See* JOURNALS.
- Direct United States Cable, Report; by Sir W. Thomson. 8vo. *London* 1876.
- Manual of Telegraph Construction; by J. C. Douglas. 8vo. *London* 1877.
- Principles and Practice of Submarine Telegraphy; by Werner Siemens and C. W. Siemens. 4to. *London* 1860.
- Report of Joint Committee on Submarine Telegraphy. Folio. *London* 1861.

TELEGRAPHY, *as under (continued):—*

Improvements in the Electric Telegraph; by — Brett and — Little. 12mo. *London* 1847.

The Telotype, or Printing Electric Telegraph; by F. Galton. 8vo. *Cambridge* 1850.
Telegraph Engineers, Society. *See* TRANSACTIONS.

Construction and Maintenance of Telegraph Lines; by R. S. Culley. 8vo. *Chatham* 1869.

Auto-kinetic Telegraph system; by F. J. Rowan. *London* 1878.

Telegraphy; by W. H. Preece. Folio. *Chatham* 1873.

Instructions for Storage and Inspection of Submarine Mining and Telegraphic Apparatus; by the War Office. 8vo. *London* 1880.

TELOTYPE; by F. Galton. *See* TELEGRAPHY.

TEN-BRINK, —, Smoke-consuming Grate for Boiler. *See* BOILERS.

TERRE-NOIRE Co.'s Exhibits, Paris. *See* EXHIBITIONS.

THEATRUM Machinarum Novum; by G. A. Böckler. *See* MACHINERY.

THEORIE mécanique de la Chaleur; by G. Zeuner. *See* HEAT.

THEORY of Heat; by J. C. Maxwell. *See* HEAT.

THEORY and Practice in Construction; by Col. Wray. *See* MECHANICS.

THERMO-DYNAMICS of Elastic Fluids; by J. Gill. *See* HEAT.

THERMO-DYNAMICS, Second Law; by W. J. M. Rankine. *See* HEAT.

THERMOMETER and Pyrometer, Electrical Resistance; by C. W. Siemens.
See INSTRUMENTS.

THERMOMETER, Resistance; by C. W. Siemens. *See* INSTRUMENTS.

THOMAS, C., Acrididæ of North America. *See* UNITED STATES.

THOMAS, J. L., Mines of Rio Tinto, Spain. *See* MINES.

THOMSON, Sir W., Direct United States Cable. *See* TELEGRAPHY.

THREE-CYLINDER Steam Engine; by — Correy. *See* STEAM ENGINE.

THURSTON, R. H., Copper-Tin Alloys. *See* METALLURGY.

TIMBER, *as under:—*

Bethell's Creosoting process, Experiments by L. Crepin, &c. 8vo. *Bath* 1864.

Boucherie's process for Preserving Timber from Decay. 8vo. *London* 1856.

Preservation of Timber by Sulphate of Copper; by A. Legé and Fleury-Pironnet (French). 8vo. *Neuilly* 1859.

Properties and Characteristics of Timber; by T. Laslett. Folio. *Chatham* 1867.

Strength and Deflection of Timber, Tables; by W. Lea. *See* TABLES.

Strength and Stress of Timber; by P. Barlow. 8vo. *London* 1817.

TIMEKEEPERS, Errors of; by H. C. R. S. Hastings. *Banbury* 1846.

TIMES, File from 1878.

TIMES, Index from 1880. 8vo. *London* 1880. *See* JOURNALS.

TIN-ORE, Detrital Tin Ore of Cornwall; by W. J. Henwood. *See* MINERALOGY.

TOBACCO Manufacture. *See* MACHINERY.

TOBACCO, Specifications. *See* PATENTS.

TOLHAUSEN, A., French, German, and English Technical Dictionary. *See* DICTIONARIES.

TOMLINSON, C., Encyclopædia of Useful Arts. *See* MACHINERY.

TOOLHOLDERS, Moveable Toolholders; by E. P. Baviile. *See* MACHINERY.

TOOLS, Engineering. *See* MACHINERY.

TOOLS, Mining. *See* MINES.

TORPEDO and Ram, for resisting Invasion; by Colonel Grant. *London* 1877.

TOWING by Wire Rope on Canals; by M. Eyth. *See* CANALS.

TOWN Dwellings. *See* BUILDING.

TOYS, &c., Specifications. *See* PATENTS.

TRACTION. *See* RAILWAYS.

TRAILL, T. W., Experiments on Steel. *See* STEEL.

TRAINS. *See* RAILWAYS.

TRAMWAYS, *as under* :—

Tramways; by D. K. Clark. 8vo. *London* 1878.

Reports on Wire Tramways now in operation. 8vo. *London* 1871.

TRANSACTIONS of Scientific and Technical Societies, *as under* :—

Academy of Sciences, Reports from 1879 (French). 4to. *Paris*.

American Railway Master Mechanics' Association, Report of Twelfth Annual Convention. 8vo. *Cincinnati* 1879.

American Society of Civil Engineers, Transactions (from commencement 1868). 8vo. *New York*.

American Society of Mechanical Engineers, Transactions (from commencement 1880). 8vo. *New York*.

American Institute of Mining Engineers, Transactions (from commencement 1873). 8vo. *Philadelphia*.

Asiatic Society of Bengal, Journal (from 1843: excepting 1847, 1848, 1850, 1852 to 1858, 1860, 1862, 1863). 8vo. *Calcutta*.

— — — — Proceedings (from 1865). 8vo. *Calcutta*.

Association for the Advancement of Science (French). (From 1878.) 8vo. *Paris*.

Austrian Academy of Sciences (German).

Austrian Engineers' and Architects' Society (German.) (From 1879.) 4to. *Vienna*.

Belgian Royal Academy (French). Reports (from 1879). 8vo. *Brussels*.

Berlin Academy of Sciences, Transactions 1845 (German). 4to. *Berlin*.

Berlin Engineers' and Architects' Society, 1867 (German). *Berlin*.

British Association for the Advancement of Science, Reports (from commencement 1831: excepting 1839, 1840). 8vo. *London*.

British Association of Gas Managers (from 1870). 8vo. *London*.

Chesterfield and Derbyshire Institute of Engineers, Transactions (from commencement 1871). 8vo. *London* and *Derby*.

TRANSACTIONS of *Scientific and Technical Societies*, as under (continued):—

- Christiania Society of Science (Norwegian). *Christiania* 1873.
- Civil Engineers, Institution of, Proceedings (from commencement 1837). 8vo. *London*. (And 4to. Vols. 1-3.)
- Civil and Mechanical Engineers' Society. Proceedings 1872 and 1873. *London*.
- Cleveland Institute of Engineers, Proceedings (from 1870). 8vo. *Middlesbrough*.
- Cornwall and Devonshire Miners' Association, Annual Reports (from 1872). 8vo. *Truro*.
- Dortmund Mining Engineers. Report 1879. 4to. *Essen*.
- Dudley Geological and Scientific Society. Odd Numbers, 1865, 1867, 1877.
- Dutch Royal Institute of Engineers, Journal (from 1876). (Dutch.) 4to. *Gravenhage* 1876.
- Engineers and Shipbuilders in Scotland, Institution of, Transactions (from commencement 1857). 8vo. *Glasgow*.
- Franklin Institute, Journal (from 1879). *Philadelphia*.
- French Society of Civil Engineers, Proceedings (from commencement 1848). 8vo. *Paris*.
- Glasgow Philosophical Society, Proceedings (from commencement 1841). 8vo. *Glasgow*.
- Hanover Architects' and Engineers' Society, Proceedings (from commencement 1855, German). Folio. *Hanover*.
- Ireland, Institution of Civil Engineers of, Transactions (from commencement 1845). 8vo. *Dublin*.
- Iron and Steel Institute, Journal (from commencement 1869). 8vo. *London*.
- Liverpool Polytechnic Society, Transactions. 8vo. *Liverpool* 1841-1856.
- ——— Journal (from 1864). 8vo. *Liverpool*.
- Manchester Geological Society, Transactions (from vol. 15, 1878-9). 8vo. *Manchester*.
- Manchester Literary and Philosophical Society, Memoirs (from commencement 1785.) 8vo. *London*.
- Manchester Scientific and Mechanical Society, Proceedings (from commencement 1874). 8vo. *Manchester*.
- Marseilles Scientific and Industrial Society, Bulletin (from commencement 1872, French). 8vo. *Marseilles*.
- Milan College of Architects and Engineers (Italian), Transactions (from 1877). 8vo. *Milan*.
- Mining Institute of Scotland, Transactions (from 1879). 8vo. *Hamilton*.
- Mulhouse Society (from 1845, not complete, French). 8vo. *Mulhouse*.
- Municipal Engineers and Surveyors, Proceedings (from 1877). 8vo. *London*.
- Naval Architects, Institution of, Transactions (from commencement 1860). 4to. *London*.
- North of England Institute of Mining and Mechanical Engineers, Transactions (from commencement 1854). 8vo. *Newcastle*.

TRANSACTIONS of *Scientific and Technical Societies, as under (continued):—*

- North of France Industrial Society, Reports (from Part IV., 1878. French). 8vo. *Lille*.
- North Staffordshire Institute of Engineers (Jan. and Feb. 1879). *Newcastle-under-Lyne*.
- Norwegian Polytechnic Society, Proceedings (from 1854, Norwegian). 4to and 8vo. *Christiania*.
- Philadelphia Engineers' Club (1879). *Philadelphia*.
- Physical Society, Proceedings (from 1880). 8vo. *London*.
- Ponts et Chaussées, Annales (from 1879, French). 8vo. and folio plates. *Paris*.
- Ponts et Chaussées, Ecole Nationale, Catalogue of Models and Drawings; by H. Baron. 8vo. *Paris* 1873.
- — — — — Courses of Instruction. (French.) Folio. *Paris* 1850.
- — — — — Library Catalogue. 8vo. *Paris* 1872.
- — — — — Supplement. 8vo. *Paris* 1881.
- Professional Papers on Indian Engineering, 1864–1870. 8vo. *Roorkee*.
- Rouen Industrial Society (from 1880). 8vo. *Rouen*.
- Royal Agricultural Society, Journal (second series, from commencement 1865). 8vo. *London*.
- — — — — Chemical Committee. 8vo. *London* 1876.
- Royal Artillery Institution, Proceedings (from commencement 1844). 8vo. *Woolwich*.
- Royal Cornwall Polytechnic Society, Reports (from commencement 1833). 8vo. *Falmouth*.
- Royal Engineer Corps, Professional Papers (from commencement 1851: excepting vol. 3, 1853–1854). 8vo. and 4to, 1842. *London*.
- Royal Institute of British Architects, Transactions (from 1879). 4to. *London*.
- Royal Institution of Great Britain, Proceedings (from commencement 1851). 8vo. *London*.
- Royal Irish Academy, Proceedings and Transactions (incomplete). Folio. *Dublin*.
- Royal Scottish Society of Arts, Transactions (from commencement 1841). 4to. *Edinburgh*.
- Royal Society, Proceedings (from commencement 1800). 8vo. *London*.
- — — — — Philosophical Transactions (6 years). 4to. *London* 1854–1859.
- Royal Society of Edinburgh, Transactions (from 1875). 8vo. *Edinburgh*.
- Royal United Service Institution, Journal (from commencement 1857). 8vo. *London*.
- Saint Quentin Industrial Society, Reports (from 1879, French).
- Sassoon Mechanics' Institute, Bombay, Papers. 8vo. *Bombay* 1857–1867.
- — — — — Proceedings (from 1865). 8vo. *Bombay*.
- Saxon Engineers' and Architects' Society, Proceedings (from 1868, German). 8vo. and folio plates. *Dresden*.

TRANSACTIONS of *Scientific and Technical Societies, as under (continued)* :—

Smithsonian Institution, Washington, Reports (from 1863). 8vo. *Washington*.

Society of Arts, Journal (from 1855). 8vo. *London*.

Society for the Encouragement of National Industry, Bulletin (from 1860, French). 4to. *Paris*.

Society of Engineers, Transactions (from 1861). 8vo. *London*.

South Wales Institute of Engineers, Transactions (from commencement 1859). 8vo. *Merthyr Tydvil*.

Statistical Society, Journal (from 1879). 8vo. *London*.

Surveyors, Institution of, Transactions (from commencement 1868). 8vo. *London*.

Swedish Engineers' Society, Journal (from 1878, Swedish). 4to. *Stockholm*.

Telegraph Engineers, Society of, Journal (from commencement 1875). 8vo. *London*.

Trieste Engineers' and Architects' Society, various excerpts, 1878 (German). 8vo. *Trieste*.

United States Naval Institute, Proceedings (from 1880). 8vo. *Annapolis*.

Vaudois Engineers' and Architects' Society, Bulletin (from 1877, French.) Folio. *Lausanne*.

TRANSIT of Venus in 1874. *See* ASTRONOMY.

TRANSMISSION Pneumatique des Dépêches; by MM. Mignon and Rouart. *See* PNEUMATIC.

TRANSMISSION of Sound by Wires; by W. J. Millar. *See* PHYSICS.

TRAUTWINE'S Engineers' Pocket Book. *See* MECHANICS.

TREATMENT of Steel Plates; by H. Sharp. *See* STEEL.

TREDGOLD, T., Marine Steam Engine. *See* STEAM ENGINE.

— Elementary Principles of Carpentry. *See* CARPENTRY.

— Railroads and Carriages. *See* RAILWAYS.

— Strength of Cast Iron and other Metals. *See* IRON.

— Warming and Ventilating of Buildings. *See* BUILDING.

TRESCA, H., Planing Metals. *See* MACHINERY.

— Industrial and Professional Education. *See* EDUCATION.

TRIAL of Agricultural Implements; by W. G. Cavendish. *See* AGRICULTURE.

TRIAL of Patent Causes; by W. Spence. *See* PATENTS.

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TRIALS of Engines at Messrs. Nuttall's; by M. Longridge. *See* STEAM ENGINE.

TRIALS of Strength of Rails; by T. Weishaupt. *See* RAILWAYS.

TRIESTE Engineers' Society. *See* TRANSACTIONS.

TRURAN, W., Iron Manufacture of Great Britain. *See* IRON.

TUBES, Resistance to Collapse; by W. Fairbairn. *See* MECHANICS.

TUBES, Resistance to Collapse; by T. Belpaire. *See* MECHANICS.

TUBULAR and Double-Cased Vessels, for Heating Water and Condensing Steam. *See* STEAM.

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- TURNING. *See* MACHINERY.
- TURNING and Mechanical Manipulation; by C. Holtzapffel. *See* MACHINERY.
- TWEDDELL, R. H., Direct-acting Hydraulic Machinery. *See* HYDRAULICS.
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- TYNE Improvements; by T. J. Taylor. *See* RIVERS.
- TYNDALL, J., Sound. *See* PHYSICS.
- Fragments of Science. *See* PHYSICS.
- Faraday as a Discoverer. *See* FARADAY.
- Heat a mode of Motion. *See* HEAT.
- Lectures on Light. *See* PHYSICS.
- Lessons in Electricity. *See* ELECTRICITY.
- Notes of Lectures on Light. *See* PHYSICS.
- Contributions to Molecular Physics in the domain of Radiant Heat. *See* HEAT.
- TYRONE, Geological Report. *See* IRELAND.

U.

- UMBRELLAS, Specifications. *See* PATENTS.
- UNITED SERVICE Institution, Royal. *See* TRANSACTIONS.
- ——— Lectures to Officers of Volunteer Corps. 8vo. *London* 1873.
- UNITED STATES, *as under* :—
- United States Coast Survey, Meteorological Researches. Part 1.
- United States Congressional Directory; by B. P. Poore. 8vo. *Washington* 1871.
- Foreign and Domestic Commerce of United States, Statistics for 1864. 8vo. *Washington* 1864.
- United States Geological Survey, Acrididæ of North America; by C. Thomas. Vol. 5, 4to. *Washington* 1873.
- ——— Elevation of Country west of Mississippi River; by H. Gannett. 8vo. *Washington* 1873.
- ——— Fossil Vertebrates; by J. Leidy. Vol. 1, 4to. *Washington* 1873.
- ——— Idaho and Wyoming; by F. V. Hayden. 8vo. *Washington* 1879.
- ——— Indiana, Report for 1869, with maps; by E. Cox, State Geologist. 8vo. *Indianapolis* 1869.
- ——— List of Elevations. 8vo. *Washington* 1873.

UNITED STATES, *as under (continued):—*

United States Geological Survey, Meteorological Observations during 1872.
See METEOROLOGY.

— — — — — Montana, Idaho, Wyoming, and Utah; by F. V. Hayden.
 4 vols. 8vo. *Washington* 1873.

— — — — — Reports on Nebraska, Wyoming, Colorado, and New
 Mexico; by F. V. Hayden. 8vo. *Washington* 1873.

United States Immigration, special report; by E. Young. *Washington* 1872.

Bureau of Statistics, Monthly Reports, March 1869 to April 1870. 4to.
Washington.

Indians of Cape Flattery; by J. G. Swan. Folio. *Washington* 1869.

Lepidoptera of North America; by J. G. Morris. Part 1. 8vo. *Washington* 1862.

United States Meteorological Observations from 1854 to 1859. *See METEOROLOGY.*

United States National Academy of Sciences, Reports 1867-1868. 8vo.
Washington 1868.

United States Naval Institute. *See TRANSACTIONS.*

Cincinnati Observatory, Report; by C. Abbe, Director. 8vo. *Cincinnati* 1870.

Patent Office Reports. *See PATENTS.*

Public Ledger Building, Philadelphia. *See BUILDING.*

Public Schools, Report of Controllers for Pennsylvania. 8vo. *Philadelphia* 1867.

Report on Public Works in United States; by M. Malézieux. 4to. *Paris*
 1873.

Report of Secretary of War. 8vo. *Washington* 1866.

Sewerage of Providence City; by J. H. Shedd. 8vo. *Providence* 1874.

Topographical Survey of Adirondack Wilderness, Reports; by V. Colvin.
 2 vols. 8vo. *Albany* 1873 and 1874.

United States Treasury, Finance Report for 1870. 8vo. *Washington* 1870.

UNITS and Physical Constants; by J. D. Everett. *See PHYSICS.*

UNIVERSITY College, London, Regulations. *See EDUCATION.*

UNWIN, W. C., Machine Design. *See MACHINERY.*

— Railway Construction. *See RAILWAYS.*

— Steam Engine. *See STEAM ENGINE.*

— Stress of Beams. *See BRIDGES.*

— Wrought-Iron Bridges. *See BRIDGES.*

URE, A., Cotton Manufacture of Great Britain. *See COTTON.*

— Dictionary of Arts, Manufactures and Mines; by R. Hunt. *See DICTIONARIES.*

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V.

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- VICTORIA Patents. *See PATENTS.*
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- VIENNA Patent Congress. *See PATENTS.*
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- VOITURES à Deux Étages pour Chemins de fer; by MM. Bournique and Vidard. *See RAILWAYS.*
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WATCHES, Clocks, &c., Specifications. *See* PATENTS.

WATER. *See* HYDRAULICS.

WATER Supply, Rainfall, Reservoirs, &c.; by A. R. Binnie. *Chatham* 1877.

WATER-TUBE Boilers; by J. F. Flannery. *See* BOILERS.

WATSON, W., Remarkable Public Works shown at the Philadelphia Centennial Exhibition. *See* EXHIBITIONS.

— Protection of Life from Machinery Casualties. *See* MACHINERY.

WATT, Memorials of James Watt; by G. Williamson. 4to. *Greenock* 1856.

— Life of James Watt; by P. Muirhead. *London* 1858.

WAVES which travel along with Ships; by W. J. M. Rankine. *See* SHIPS.

WAZON, —, Architecture navale. *See* SHIPS.

WEALE'S Dictionary. *See* DICTIONARIES.

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WEAVING, Specifications. *See* PATENTS.

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 steamships, by A. B. Brown ; 1874, p. 33.
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 Pressure-Intensifying Apparatus applied to Hydraulic Presses, by R. H.
 Tweddell ; 1878, p. 45.
 Hydraulic Machinery at Toulon Naval Dockyard, by M. Berrier-Fontaine ;
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 Water-Power Engines with Variable Stroke, by J. Hastie ; 1879, p. 484.
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- Ashton and Storey's Continuous Indicator and Steam-power Meter, by
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- Giffard's Boiler Injector, by J. Robinson ; 1860, p. 39.
 Giffard's Boiler Injector (Supplementary Paper), by J. Robinson ; 1860, p. 74.
 Sellers' Self-Adjusting Injector, by J. Robinson ; 1866, p. 266.

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- Pyrometer for High Temperatures, by J. Wilson ; 1852, p. 53.
 Self-registering Anemometer, by A. Follett Osler ; 1852, p. 91.
 Equatorial Motion for Telescopes, by T. Richards ; 1855, p. 137.
 Wrought Iron Observatory, for equality of internal and external temperature,
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- New Machine for Blooming Iron, by J. Beasley; April 1851, p. 36; June 1851, p. 4.
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Compound Metallic Rods and Bars, by E. J. Payne; 1855, p. 18.
Description of Round Oak Iron Works, by F. Smith; 1860, p. 211.
New Iron Works at Grosmont, by H. C. Coulthard; 1863, p. 225.
Puddling Iron by Machinery, by H. Bennett; 1864, p. 298.
Mechanical Puddling, by W. Menelaus; 1867, p. 151.
Mechanical Puddling, by T. R. Crampton; 1876, p. 244.
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Plate Rolling Machinery, by E. Hutchinson; 1880, p. 82.

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- Manufacture of Jute, by W. Fleming; 1880, p. 380.

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- Self-Acting Knitting Machine for Knitting Hosiery by Power, by A. Paget; 1870, p. 127.

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- Improvements in Locks in the United States of America, by P. R. Hodge; June 1851, p. 16.
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 Distribution of Weight on Axles of Locomotives, by J. Robinson ; 1864, p. 92.
 Corrosion of Locomotive Boilers, and Means of Prevention, by W. Kirtley ;
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 Composition and Durability of Locomotive Boiler Tubes, by G. A. Everitt ;
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 Fireless Locomotives for Tramways, by L. Francq ; 1879, p. 610 ; 1880, p. 37.
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 Economy of Fuel in Steam Navigation, with Compound-Cylinder Engines and
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- Standard Decimal Measure of Length, by J. Whitworth ; 1857, pp. 134, 227.
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Flow of Solids, by M. Tresca ; 1878, p. 301.

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Barton and West's Piston Water Meter, by W. H. Thomas ; 1879, p. 444.

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Safety Mine Apparatus, by A. Slate ; 1854, p. 57.

Lemielle's Ventilating Machine for Mines, by S. Lloyd, Jun. ; 1858, p. 63.

Working and Ventilation of Coal Mines in Newcastle-on-Tyne District, by N. Wood ; 1858, p. 177.

Progressive Application of Machinery to Mining Purposes, by T. J. Taylor ; 1859, p. 15.

South Staffordshire Ten-Yard Coal, and Mode of Working, by W. Mathews ; 1860, p. 91.

Cast-Iron Tubbing for Sinking Shafts, by J. Brown ; 1861, p. 193.

Elevator for Colliery Drainage, by C. W. Wardle ; 1861, p. 220.

Coal and Iron Mining of South Yorkshire, by P. Jeffcock ; 1862, p. 68.

Principal Seams of Coal and Ironstone in Glasgow Coalfield, by W. Moore ; 1864, p. 229.

Jones' Coal Cutting Machine, by T. Levick ; 1864, p. 272.

Application of Machinery to Coal Cutting, by J. Fernie ; 1868, p. 135.

Guibal's Ventilating Fan at Homer Hill Colliery, by J. S. E. Swindell ; 1869, p. 78.

Various systems of Ventilation of Mines, by W. Cochrane ; 1869, p. 133.

Mode of Working and Mechanical Appliances in Midland Coalfield, by G. Fowler ; 1870, p. 146.

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 Tynewydd Colliery Inundation, by T. H. Riches ; 1877, p. 221.
 Mechanical Appliances for Accidents in Mines, by C. Hawksley and E. B.
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 Hæmatite Iron Mines of Furness District, by J. L. Shaw ; 1880, p. 363.

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- Oil Mill Machinery, by A. Samuelson ; 1858, p. 27.

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 Notes on Early History of the Railway Gauge, by W. Pole ; 1875, p. 66.
 Supplement to Notes on Early History of the Railway Gauge, by W. P.
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Steam Pile Driver, by R. Morrison; 1856, p. 287.

Steam Pile Driver, and Theory of Pile Driving, by M. Scott and A. J. Robertson; 1857, p. 12.

Steam Pile Driver with Endless Chain, by P. B. Eassie; 1867, p. 255.

PIPES.

Brockedon's Application of Vulcanised India-rubber to Pipe Joints, by E. A. Cowper; October 1848, p. 20.

PRINTING MACHINES.

Type Composing and Distributing Machine, by W. H. Mitchel; 1863, p. 34.

Bank-Note Printing Machine at Bank of Ireland, by T. Grubb; 1865, p. 166.

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Mathematical Principles of the Centrifugal Pump, by A. J. Robertson; 1852, pp. 99, 153; 1853, p. 165.

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Improvements in the Construction of Railway Wagons, by W. A. Adams; 1852, p. 206.

Osborne's Safety Coupling for Railway Wagons, by C. Markham; 1860, p. 277.

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Rivet-Making Machine, by C. D. Bergue ; 1861, p. 212.

Gray's Portable Steam Riveter, by A. Wyllie ; 1865, p. 129.

Strength and Proportions of Riveted Joints, by W. R. Browne ; 1872, pp. 53,
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Steam Road Roller used in Paris, by M. Gellerat ; 1869, p. 101.

Steam Road Roller, by W. F. Batho and T. Aveling ; 1870, pp. 109, 170.

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Hydraulic Machinery for Steering, Reversing, and Discharging Cargo &c. in steamships, by A. B. Brown; 1874, p. 33.

Raising of the Wreck "Edith" at Holyhead, by L. M. Kortright; 1878, p. 116.

Steam-ship "City of Rome," by J. Humphrys; 1880, p. 336.

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- Relations of Power and Effect in Cornish Pumping Engines, by C. Greaves; 1862, p. 147.
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- Strength of Steel containing different proportions of Carbon, by T. E. Vickers, 1861, p. 158.
- Fluid-Compressed Steel and Guns, by Sir J. Whitworth ; 1875, p. 268.
- Structure of Cast-Steel Ingots, by D. Chernoff ; 1880, p. 152.
- Remarks on Chernoff's Papers on Steel, by W. Anderson ; 1880, p. 225.
- Manufacture and Working of Steel, by D. Chernoff ; 1880, p. 286.
- Steel Compression by Steam, by A. Davis ; 1880, p. 396.

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- India-rubber Covering Machine for Telegraph Wires, by C. W. Siemens ; 1860, p. 137.
- Construction of Submarine Telegraph Cables, by F. Jenkin ; 1862, p. 211.
- Telegraph Machinery for laying Atlantic Cable, by G. Elliot ; 1867, p. 20.

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Boucherie's process for the Preservation of Timber, by J. Reid, Jun.; 1856, p. 196.

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- Mechanical Traction upon Tramways, by A. Mallet; 1878, p. 395.
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- C. Watson's Ventilating Apparatus for Buildings &c., by S. Thornton; 1857, p. 259.
- Mechanical Ventilation and Warming of St. George's Hall, Liverpool, by W. Mackenzie; 1863, p. 194.
- Ventilation of Public Buildings, by General Morin; 1867, p. 61.
- Various systems of Ventilation of Mines, by W. Cochrane; 1869, p. 133.

WATER WORKS. (*See also PUMPING ENGINES, under STEAM ENGINES.*)

- Mechanical Features of the Liverpool Water Works, by T. Duncan; 1863, p. 167.
- Mechanical Appliances of Loch Katrine Water Works for supply of Glasgow, by J. M. Gale; 1864, p. 123.
- Dublin Corporation Water Works, by P. Neville; 1865, p. 201.
- Manchester Water Works, by J. F. Bateman; 1866, p. 245.
- Mechanical Scraper for Removing Incrustation in Mains of Torquay Waterworks, by J. Little; 1873, p. 216.
- Water Supply from Wells in the Chalk basin of London, by E. Easton; 1876, p. 163.

WATER WORKS—*continued*.

Foulis' Regulator for Maintenance of Constant Pressure in Water Service Pipes,
by S. Alley ; 1879, p. 423.

Barton and West's Water Pressure Reducer, by W. H. Thomas ; 1879, p. 434.

WHEELS.

Teeth of Wheels, by F. Bashforth ; April 1848, p. 4.

Banks' Steel Tyres for Railway Wheels, by B. Fothergill ; April 1848, p. 21.

Balancing of Wheels in Locomotives and Carriages, by J. E. McConnell ; June
1848, p. 2.

Solid Wrought Iron Wheels for Railways, by H. Smith ; April 1849, p. 9.

Wheel Moulding Machine, by P. R. Jackson ; 1855, p. 41.

Improved Manufacture of Steel Tyres, by J. Ramsbottom ; 1866, p. 186.

Wheel Moulding Machine, by G. L. Scott ; 1868, p. 238.

WOOD WORKING MACHINERY.

Wood Working Machinery, by J. W. Wilson ; 1857, p. 77.

American Dove-tailing Machine, by J. Robinson ; 1868, p. 81.

Wood Working Machinery, by T. N. Robinson ; 1875, p. 248.

WORKSHOPS.

Workshops for the Locomotive Department of the Manchester Sheffield and
Lincolnshire Railway, by R. Peacock ; January 1851, p. 22.

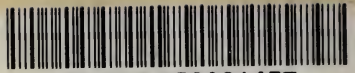
Locomotive Engine Shed and Turntables at Gateshead Station, by E.
Fletcher ; 1858, p. 256.

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